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NTERNATIONAL Railway Journal

Aug./Sept. 1961

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Erste 4000-PS-Diesel-Hydraulik

Diesel-hidráulicas 4000 CV

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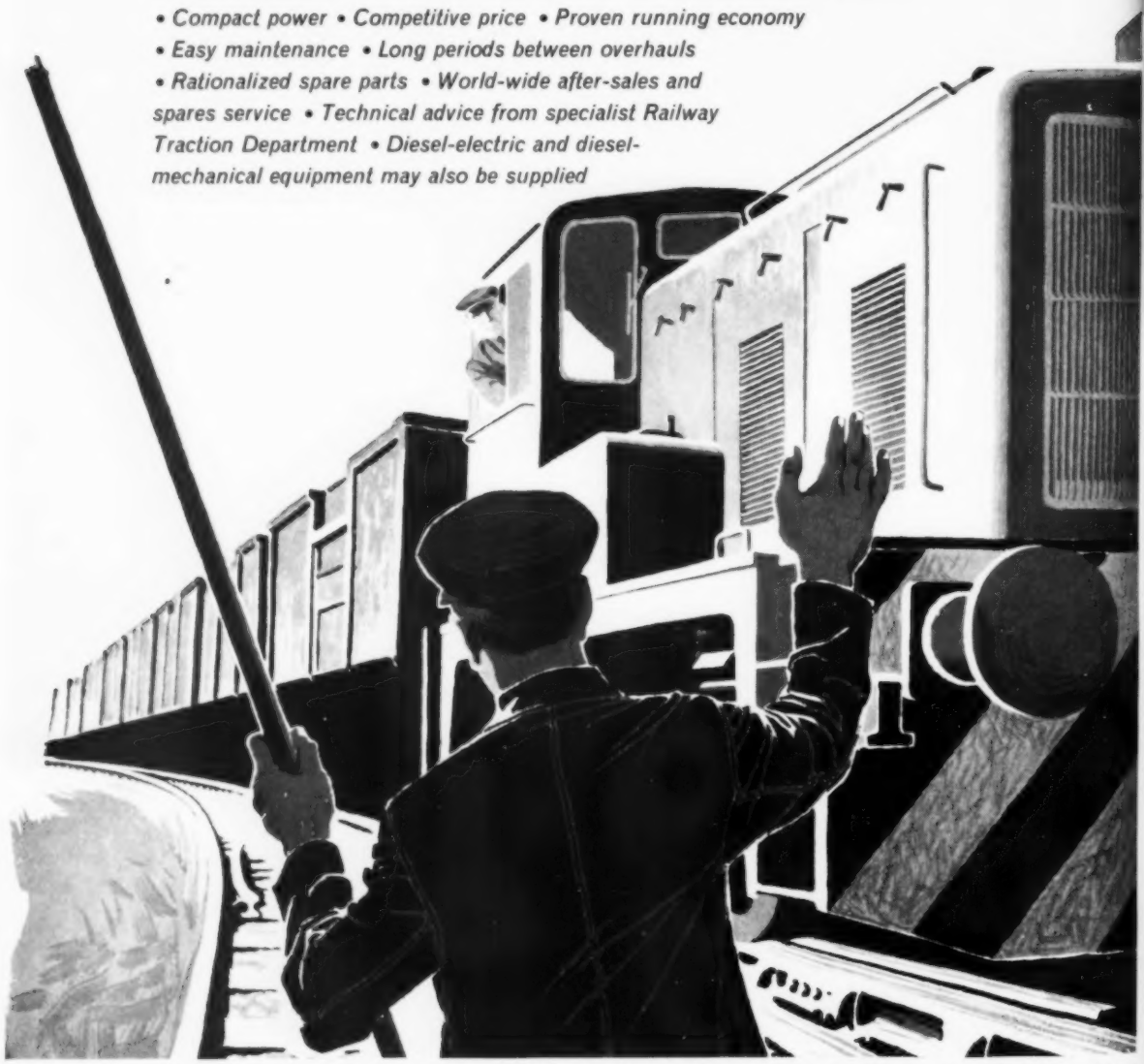

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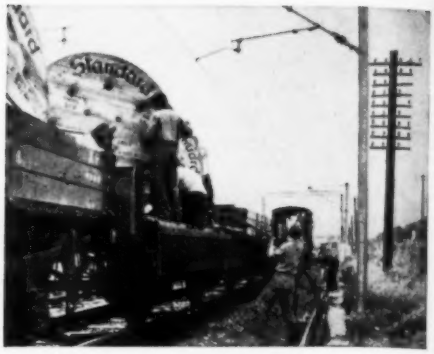

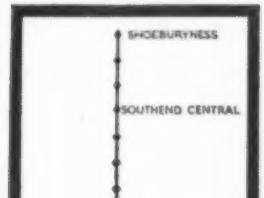

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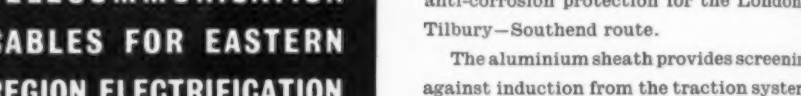

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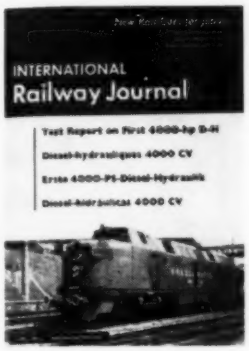

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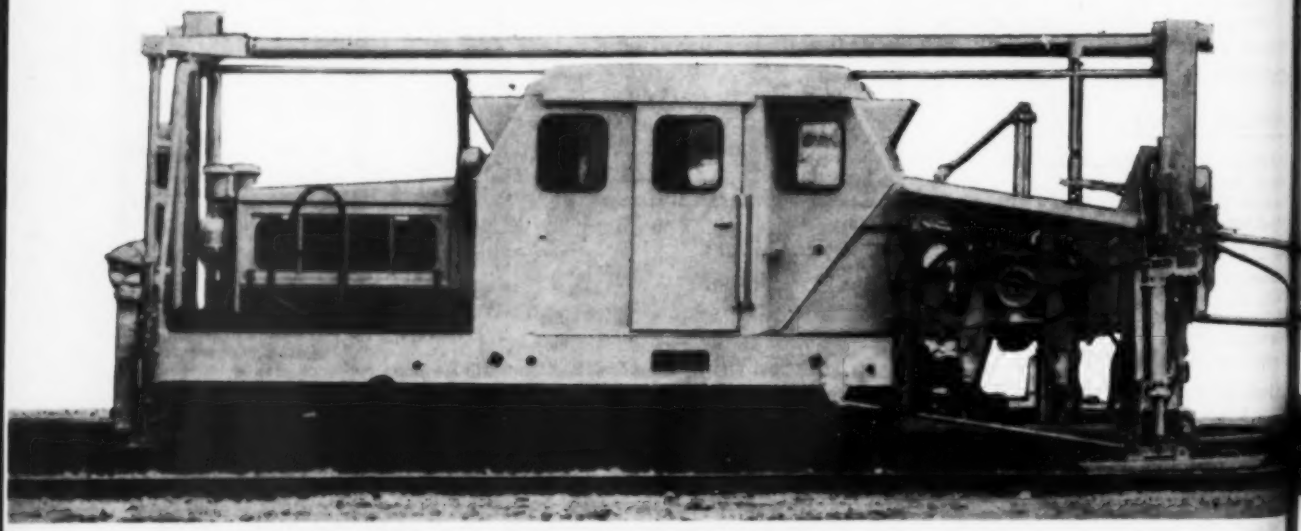

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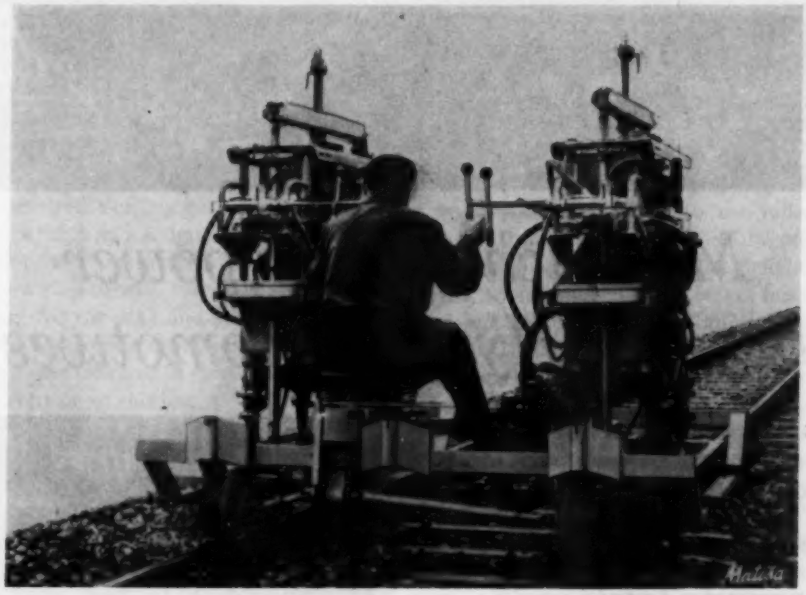

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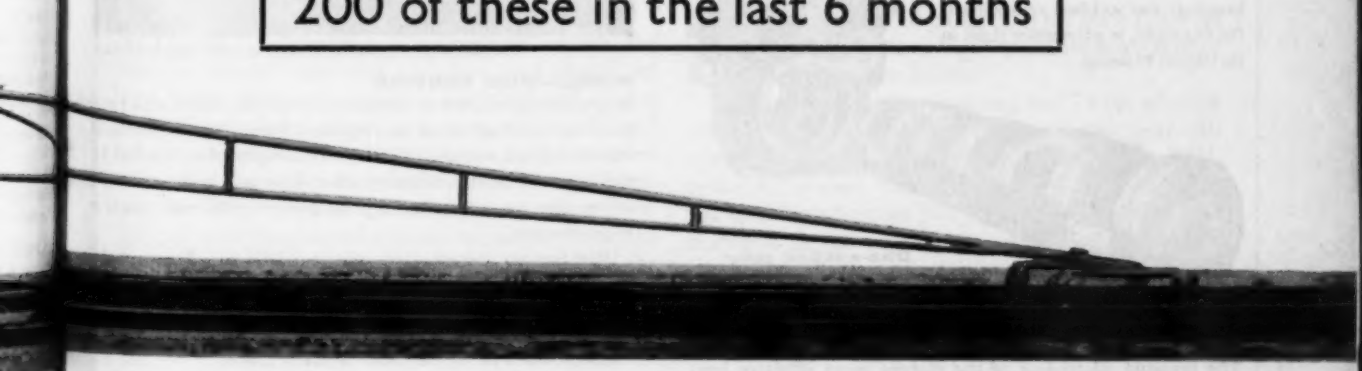

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Maybach diesels power the new Hymek locomotives

Bristol Siddeley Maybach* diesel engines have been chosen for the new Hymek diesel-hydraulic locomotives. 95 of these Type 3 locomotives have been ordered for main-line use on British Railways Western Region. This now brings the total order placed with Bristol Siddeley for British Railways to 286.

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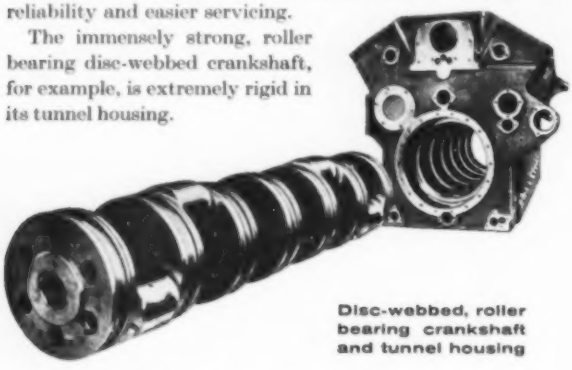
Bristol Siddeley Maybach rail traction diesel engines range from 384 to 2,000 hp and embody design features which produce more efficient operation in terms of lower wear, greater reliability and easier servicing.

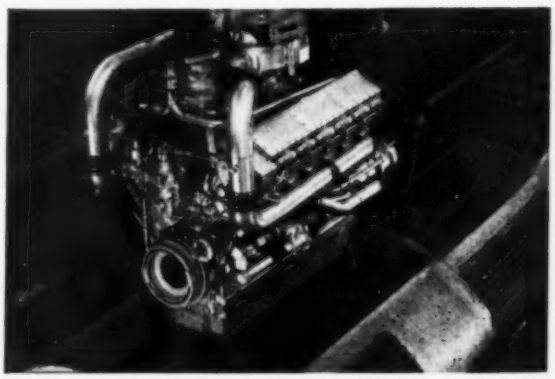
The immensely strong, roller bearing disc-webbed crankshaft, for example, is extremely rigid in its tunnel housing.



Disc-webbed, roller bearing crankshaft and tunnel housing

This results in very low main and big-end bearing wear. The pressure-oil cooling of the pistons gives effective heat dissipation which reduces liner and gas ring wear to a minimum.

Since the majority of components are identical in all models, spares stocks can be cut and servicing is simplified through interchangeability.



Maybach diesel engine being installed in D800 Class at Swindon.

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Maybach engines are in service all over the world, and have built for themselves an unsurpassed reputation as the most efficient diesel engines of today. This reputation, backed by the efficient Bristol Siddeley after-sales and spares service, offers the most satisfactory solution to all rail traction requirements.

For further information, please write to: Power Sales Manager, Power Division, Bristol Siddeley Engines Limited, PO Box 17, Coventry, England. Cables: Brisidair, Coventry.

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MARINE AND INDUSTRIAL GAS TURBINES – MARINE, RAIL AND INDUSTRIAL DIESEL ENGINES – PISTON ENGINES – PRECISION ENGINEERING PRODUCTS

WORLD REPORT

"Economic Lag" on European Railways

UIC is urging West European governments to adopt new bookkeeping methods to ease state-imposed burdens on their railway systems. Technological progress, says UIC in a report to the Transport Ministers' Conference, is outstripping efforts to meet altered economic conditions. An important step in meeting this "economic lag" says UIC, would be "normalization of financial statements to eliminate financial burdens" i.e., free or low-rate transportation of special categories of passengers and freight. In 1959, points out UIC, only two of West Europe's 14 rail systems (Netherlands and Switzerland) showed a profit. Normalization of financial statements, claims UIC, would have added France, West Germany, Italy and Luxembourg to this list.

AUSTRALIA: Western Australian Government Railways has recently placed in service the first six completedly remodernized sleeping cars on its Westland Express between Perth and Kalgoorlie. Improvements include sponge-rubber mattresses, ultra-modern interior decor, new wall-to-wall carpeting and wide use of stainless steel for covering and wear points. Plans for construction of two new air-conditioned trains for this service have been deferred in view of developments pointing to conversion of this line to standard gauge.

. . . First recommendations by a US consulting firm, which is studying the operations of the Queensland Railways, call for the introduction of data processing equipment to streamline administrative activities. The first installation will be made at Northern Division headquarters at Townsville.

. . . Dual purpose freight vehicles—similar to the "road-railer" being tested by British Railways—have been suggested as a means of attracting more business for the Queensland Railways by Minister for Transport Chalk, who recently completed a two-month tour of the US, Canada, and Britain.

BULGARIA: According to government reports, the current railway expansion plan has been completed two years ahead of schedule. Electrification of the Sofia-Plovdiv line is slated to be completed by the end of 1961. Electrification of the 116-km stretch between Russe and Dorna Oryachoviza is also underway. Goals announced by the government call for electrification of 60% of the Bulgarian rail network and a 250% increase in freight-carrying capacity by 1980. Last year freight traffic climbed 9.3% over 1959.

BRAZIL: Companhia Paulista de Estradas de Ferro —last of the big Brazilian private railways—has protested against its recent nationalization by the Brazilian State of Sao Paulo. It has called the nationalization "unconstitutional" and contrary to an earlier agreement with the Government. Although not contesting the State's right to nationalize the railway, the company protests against the take-over of large land tracts.

CAMEROONS: Agreement in principle to the financing of the initial track section of the projected Doula-Tchad Railway was reached at a Paris meeting of representatives of the Cameroons Government, the French Government, the Société d'Etudes du Doula-Tchad, the Common Market Commission and the Development Loan Fund. The section will be 350 km long and will lead from Yaoundé, capital of the Cameroons Republic, to the River Lum. Total costs are put at 8,000,000,000 francs CFA, to be raised by a subsidy of the development fund of the Common Market, a loan from the US Development Loan Fund and a payment by the French Fonds d'Aide et de Coopération.

CANADA: The government has announced it will pay $50,000,000 (Can.) to the railways in 1961 as compensation for holding freight rates at an agreed level pursuant to the Canadian Freight Rate Reduction Act. An estimated $27,000,000 of this fund will be paid to the Canadian National Railways and approximately $20,000,000 to the Canadian Pacific Railway. The balance will be shared among smaller lines. The government action was announced following a new wage increase to clerical employees, who had threatened strike action. Meanwhile the government continues to study other subsidy proposals recently suggested by a Royal Commission (IRJ, June 1961).

. . . Canadian National Railways have taken a "key step in the development of Canada's most extensive and sophisticated data processing system"—the installation of a new magnetic tape computer at CNR headquarters. It will be the nerve center of the data processing network extending from Newfoundland to British Columbia.

EAST GERMANY: Reports from the State Railways in East Germany indicate that women are being trained as electric locomotive drivers.

. . . Electrification is increasing and 75 km of track are due for change to electric traction this year. All existing electrification has been on the 15-kv $16^2/_3$ cycles AC system. The Berlin-Rostock line, however, will be a high voltage 50-cycles AC system when it is electrified in the near future. It is also planned to eventually change all existing electrified line to 50-cycles AC.

FINLAND: The Finnish State Railways' plans to purchase 70 new locomotives abroad received a serious setback during the recent session of Parliament. An appropriation for initial payments on the locomotives

CONTINUED ON PAGE 11

2

NEW JACKSON UTILITY TAMPER

MOST ECONOMICAL, HIGHLY EFFICIENT AND VERSATILE TAMPERS FOR A WIDE RANGE OF WORK

MODEL 260: Equipped with Diesel engine, large, extra-capacity generator and 4 Vibratory Tamping Units of the most powerful Jackson Track Maintainer type, this machine has maximum penetrating power in hard going, readily handles large ballast, badly fouled and cemented conditions. It's an excellent tamper for all work, whether it be smoothing, spot tamping or surfacing wherever maximum production tampers are not indicated. Very fast for new construction or any high lift work.

MODEL 104: Has gasoline engine and 4 TM1161 Vibratory Tamping Units. This is an excellent machine for work in all but the most difficult going . . . an ideal all-around tamper for yard and branch line spot tamping, surfacing work, and emergency tamping. OK, too, for general use in small or soft ballasts. Excellent for new construction and high lift ballast insertions anywhere.

BOTH MODELS OPTIONALLY AVAILABLE WITH LIFTING JACKS

SIMPLIFIED FOR EASY, ECONOMICAL MAINTENANCE: Both of these relatively low-priced models are simplified in design, power plant and controls for easy, economical operation and maintenance. Tops optionally available. You'll find the one best suited to your requirements an exceedingly good investment. Detailed information is yours for the asking.

CROSS TAMPING: Jackson Tampers, like no others, are highly efficien in cross tamping because of their unique and powerful vibratory action whic uniformly consolidates to maximum compaction a perfect tie bed of larg proportions right under the rail base where it belongs.

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RÉSUMÉ

2 NOUVELLES BOURREUSES JACKSON – Economiques, très efficaces.

MODELE 260: Moteur Diesel, génératrice à grande capacité et 4 bourreuses vibratoires du type Jackson le plus puissant. La machine a une force de pénétration maximum et manipule facilement du gros ballast. Excellente pour tous travaux d'entretien dans n'importe quelle sorte ou condition de ballast. Rapide pour des nouvelles constructions ou des hautes élévations.

MODELE 104: Moteur à essence et 4 bourreuses vibratoires. Excellent pour tous travaux, sauf les très grosses besognes. Idéal pour le bourrage de petites surfaces et les travaux de nivellement et pour usage général dans des ballasts moux ou à couche mince. Les vérins de levage peuvent être commandés séparément. Modèle simplifié d'entretien facile et économique.

BOURRAGE ENTRECROISE: Seules les bourreuses Jackson sont efficaces dans le bourrage entrecroisé. Leur action vibratoire unique consolide uniformément une assiette parfaite de grandes proportions pour les traverses sous la base des rails.

RESUMEE

2 NEUE JACKSON GLEISSTOPFER – Wirtschaftlich, sehr wirksam.

MODELL 260: Dieselmotor, Stromerzeuger mit hoher Leistungsfähigkeit, mit 4 vibrierenden Gleisstopfmaschinen vom kräftigsten Jackson Typ. Die Maschine besitzt eine maximale Durchdringungsfähigkeit und bearbeitet bequem grosse Bettungsmengen. Ausgezeichnet für alle Unterhaltungsarbeiten in jeder Sorte oder Beschaffenheit der Bettung. Arbeitet schnell für Neuanlagen oder mit hohem Aufzug.

MODELL 104: Benzinmotor und 4 vibrierende Gleisstopfmaschinen. Ausgezeichnet für alle, ausser den schwierigsten, Arbeiten. Ideal zum Stopfen kleiner Flächen und zum Einebnen sowie zu allgemeiner Verwendung in dünnen und weichen Bettungen. Schraubenwinden werden auf Wunsch mitgeliefert. Eine vereinfachte Ausführung für leichte und wirtschaftliche Unterhaltung.

KREUZSTOPFEN: Nur Jackson Gleisstopfer sind für das Kreuzstopfen leistungsfähig. Dank ihrer einzigartigen vibrierenden Leistung konsolidieren sie einheitlich eine perfekte Bettungssohle von grossen Ausmassen unter der Schienenauflage.

RESUMEN

Dos nuevas apisonadoras JACKSON – Económicas y de alta eficiencia. El Modelo 260 tiene motor diesel, generador de gran capacidad y 4 apisonadoras vibratorias Jackson del tipo más potente. Esta máquina tiene una fuerza de penetración máxima y trabaja fácilmente con balasto grande. Excelente para todo trabajo de mantenimiento en cualquier clase de balasto. De acción rápida para obras nuevas o alzamientos grandes.

El Modelo 104 tiene motor de gasolina y 4 apisonadoras vibratorias. Ideal para casi cualquier trabajo, como apisonamientos localizados, trabajos de nivelación y uso general en balastos suaves o pequeños. Gatos elevadores opcionales. De mantenimiento sencillo y económico.

APISONADO TRANSVERSAL: Sólo las apisonadoras Jackson resultan eficientes para el apisonado transversal. Gracias a su excepcional efecto vibratorio el lecho para la traviesa queda perfectamente consolidado, con gran uniformidad en toda el área bajo la base del riel.

JACKSON VIBRATORS Inc.

WORLD REPORT CONTINUED

was reduced and a stipulation introduced that the funds could be used only for the domestic procurement of locomotives.

INDIA: Early reports from tests of the Suri-transmission fitted diesel on the Northern Railway (IRJ, July, p. 21) would appear to justify estimations of Indian Railway engineers that the new transmission system would reduce costs. Engineers now estimate that savings, when the transmission is fitted in a 2000-hp diesel, for example, will be twice the £1200 initially expected.

. . . The first Indian-made electric locomotive left the shops of the Chittaranjan Locomotive Works last month. Sixty electric units will be produced annually. The Works will also continue to manufacture steam units at the rate of 164 per year.

IRELAND: Provisional figures covering the 1960 operations of the Irish Transport Company (CIE) indicate that losses have been reduced to less than £250,000. If this trend continues CIE will pay its way before the 1964 deadline laid down in the Government's 1958 Transport Act (IRJ, April, p. 24). Rail receipts were up more than £500,000 compared with 1959. This has been largely attributed to greater commercial freedom and the success of the system's selling efforts.

ITALY: A new railway rolling stock works is to be built at Reggio for operation by a specially formed company called Officine Meccaniche Calabresi S.p.A., with an initial capital of 1,000,000,000 lire. The plant will produce track equipment as well as rolling stock. Behind the project is the State-owned concern, Finmeccanica of Roma, and the private Turin company, Fiat S.p.A. The plant will base its production program on the requirements of Italian rail modernization.

JAPAN: Japan National Railways will have 33 new freight express trains in operation when new schedules come into effect 1 Oct. Shipments on the freight expresses carry guarantees of direct loading from truck to train and immediate scheduled train departure.

. . . Design and engineering plans for test prototypes of the New Tokaido Line super-express trains are nearing completion. Operating requirements will call for a top speed of 250 km/h and an average speed of 170 km/h to cover the Tokyo-Osaka run in three hours. JNR's claims that the new trains will be the world's fastest have been disputed by the French Railways.

LUXEMBOURG: Annual Report for 1960 of the National Luxembourg Railways shows an increase of 8.3% tons transported. There was a decrease in passengers carried (-3.8%) attributable to stiffer competition from private cars. Operating costs were weighed down by new electrification projects. It is expected that all remaining steam motive power will be withdrawn by 1962.

MIDDLE EAST: Economic studies by the Israeli Minister of Transport has reportedly given new support for the proposed Eilat Railway line. The studies are said to conclude that construction of the 208-km line would be economically feasible.

. . . The Hedjaz railway, built before the First World War and subsequently destroyed, is to be repaired. This has been announced after the reaching of an agreement between the Governments of Jordan, Saudi-Arabia and of the Syrian region of the UAR.

CONTINUED ON PAGE 17

The Railways of BRAZIL purchase 70 more

GENERAL MOTORS LOCOMOTIVES

Progressive modernisation of the Brazilian railway system takes another big step in 1961 with the delivery of 70 more General Motors Diesel-Electric locomotives. 55 units—Models G12 and GL8—are going to the R.F.F.S.A., and 15 GL8's to the E.F. Sorocabana.

The improved productivity GM Diesels are bringing on Brazilian railways is evidenced by the fact that, although the number of freight cars was only 2.3% higher in 1959 than in 1958, they carried 19.1% more freight.

The Rede Mineira de Viacao, for example, showed an increase in 1959 of 10.7% over the previous year in gross tonnage hauled—a gain officials of the road attribute exclusively to the better service offered by GM Diesel-Electrics.

For construction of the new capital, Brasilia, rail shipments of cement from the Belo Horizonte area jumped from 63,000 tons in 1958 to 99,000 tons in 1959. Diesel-Electric locomotives also handled a 155,000-ton increase in coal loadings from the port of Angra dos Reis to the Cia. Siderurgica Nacional, Brazil's great steel mill at Volta Redonda.

On the Vitoria a Minas, which carries about 90% of Brazil's exports of iron ore, a fleet of General Motors Diesel locomotives transported 3,261,000 tons in 1959 compared with 2,247,000 tons in 1958. This operation showed a profit in 1959 of Cr. 126 million.

Throughout the world General Motors locomotives have proved their ability to haul higher tonnages more economically than any others. To learn the benefits they can bring to your railway, consult General Motors Overseas Operations.

GENERAL MOTORS OVERSEAS OPERATIONS

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the big lift....

Cowans Sheldon 250 Ton Diesel Railway Breakdown crane

There's BIG capacity for hard work in this Cowans, Sheldon 250 Ton Diesel-Hydraulic Breakdown Crane. This, the largest Railway crane to come out of Great Britain, was completed in 9 months, and together with a smaller 150 ton version, is for the Quebec Cartier Mining Company. For reliable Cranes of all types, and for speedy delivery, consult Cowans Sheldon, the Crane Specialists.

DIESEL AND STEAM BREAKDOWN CRANES
HEAVY RAILWAY WORKSHOP EQUIPMENT
DOCKSIDE AND SHIPYARD CRANES

COWANS SHELDON

COWANS, SHELDON & CO. LTD.,
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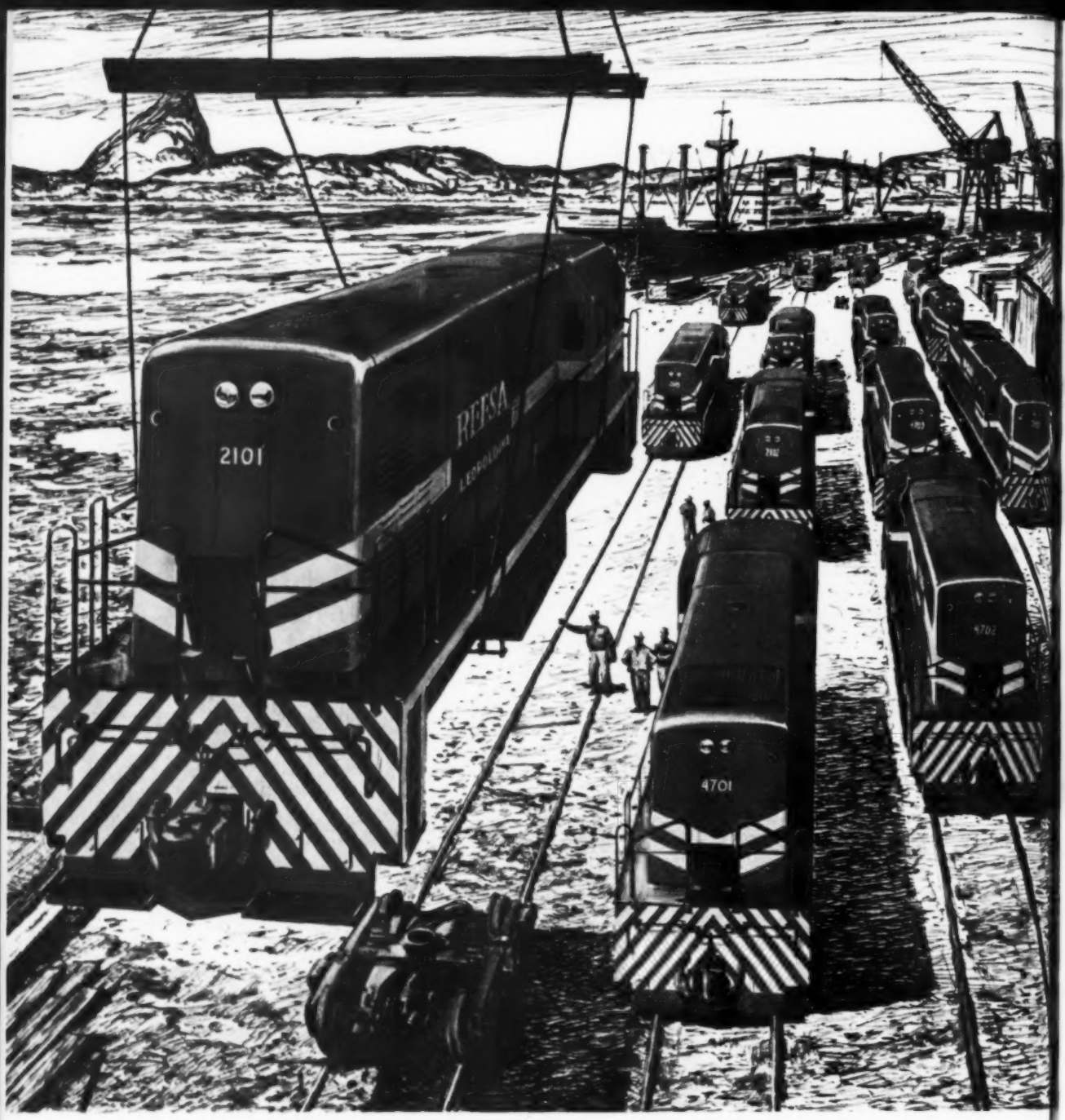
TELEPHONE: CARLISLE 24196-7
LONDON OFFICE: AFRICA HOUSE, KINGSWAY, W.C.2
TELEPHONE: HOLBORN 0268



SHIPLOADS OF PROGRESS... 180 G-E locomotives will soon be delivered to the Brazilian Railway System. These versatile workhorses will provide a total of 577 General Electric locomotives to form the heart of a vital transportation system. For greater railway efficiency, economy and profits... specify General Electric.

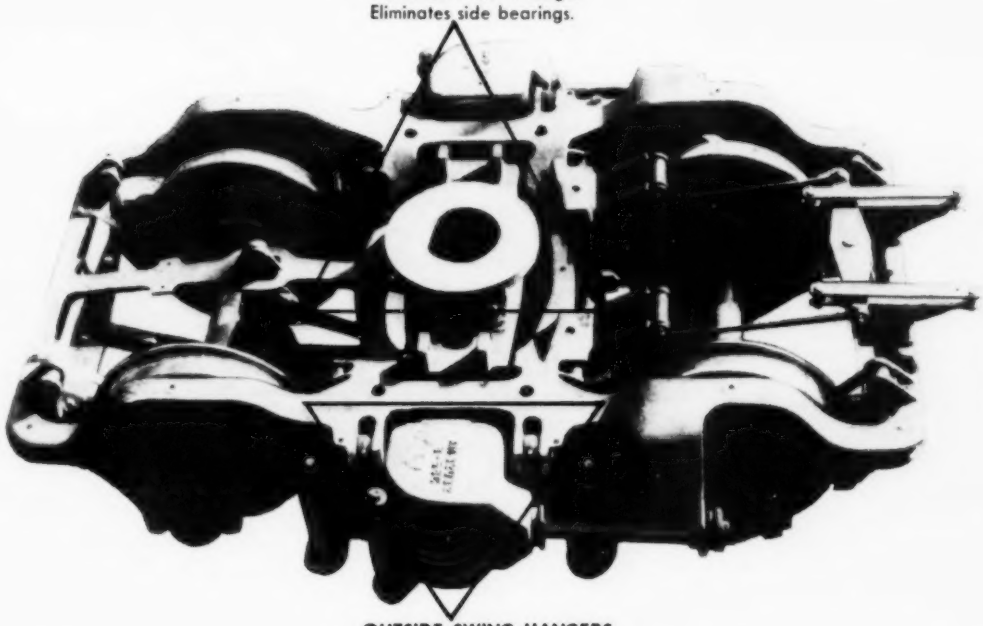
120-10

PIONEER IN RAILWAY MOTIVE POWER
FOR OVER HALF A CENTURY

GENERAL ELECTRIC

REPRESENTED THROUGHOUT THE WORLD BY THE INTERNATIONAL GENERAL ELECTRIC COMPANY • MAIN OFFICE: 159 MADISON AVENUE, NEW YORK 16, NEW YORK, U.S.A.

LARGE CENTRAL BEARING
Eliminates bogie shimmy.
Increases wheel mileage.
Eliminates side bearings.



OUTSIDE SWING HANGERS
Inspection and maintenance are quick and easy.
Broader spring base contributes to better riding.

YOU CAN SEE THE DIFFERENCE IN COMMONWEALTH PASSENGER BOGIES

The large central bearing in Commonwealth passenger coach bogies eliminates side bearings and bogie shimmy, and also increases wheel mileage.

The outside swing hangers provide a broader spring base which contributes to a smoother passenger ride, and they are located so that inspection and maintenance are quick and easy.

These are two of the superior features which have made Commonwealth cast steel bogies known and used around the world on local and inter-city transit systems and railways. A wide variety of designs is available to fit your need, each design based on General Steel's more than 50 years of experience in designing, making and service-testing passenger bogies.

Commonwealth products are furnished completely machined and are designed for all track gauges by

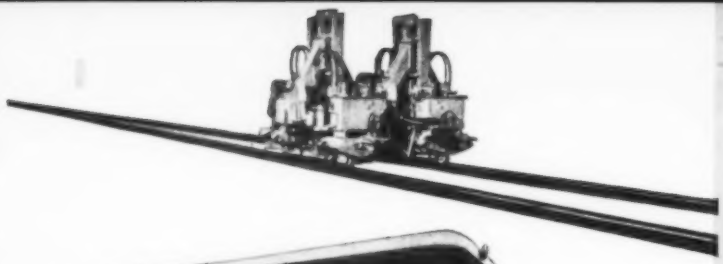
GENERAL STEEL INDUSTRIES, INC.

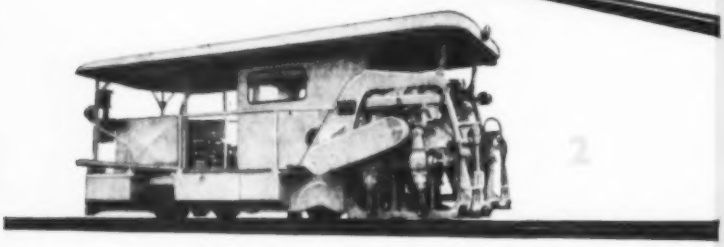
Granite City, Ill. • Eddystone, Pa. • Avonmore, Pa., U.S.A.
Subsidiary: St. Louis Car Company, St. Louis, Mo.

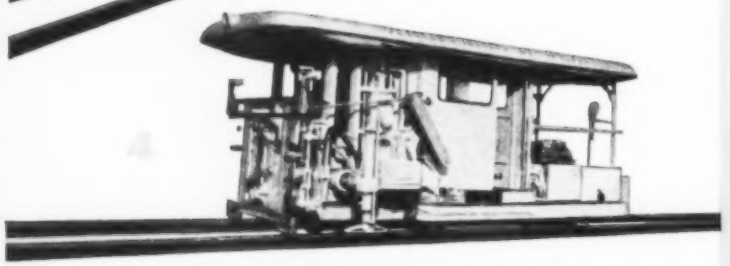
Commonwealth Products are produced under license in Australia, Canada, England and South Africa

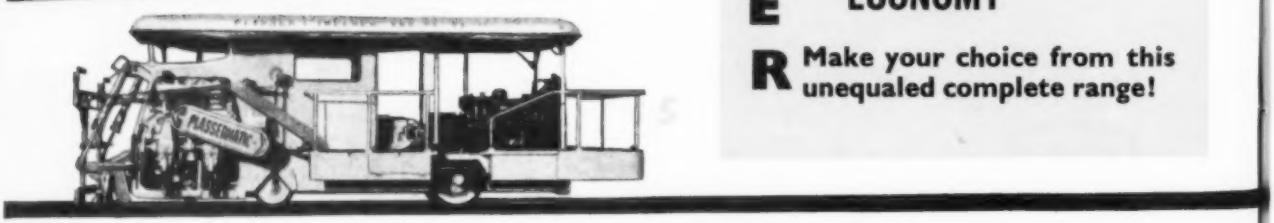
COMMONWEALTH SALES CORPORATION

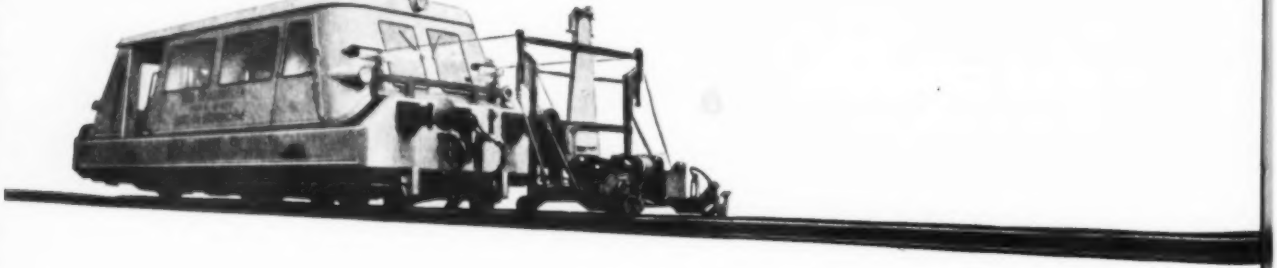
International Representatives: Granite City, Illinois, U. S. A., *Telegraph:* "Comsteelco"











PROVED

L (1) Spot Tamper KST 25

A (2) High Speed Tamper VKR-03

S (3) Streamlined VKR-03 FI Noise reduced

S (4) Plassermatic 300 Universal Economy Tamper

E (5) Plassermatic VKR-04 High Capacity Tamper

R (6) Streamlined VKR-04 Spec. with self propelled front dolly

&

TAMPERS

H Designed to suit the needs of the railways of all countries

E Designed for

U HIGH SPEED

R QUALITY

E ECONOMY

R Make your choice from this unequaled complete range!

137 Plassermatics have been sold since 1960

PLASSER & THEURER

cut the costs

Vienna I., 3, Johannesgasse **AUSTRIA** **Factories: Linz/Danube**

(Advertisement)

SUMMARY

Quality pays!

So far 137 PLASSERMATICS have been sold to the following countries:

- Austria
- Australia
- British East Africa
- Canada
- Czechoslovakia
- Denmark
- England
- France
- Finland
- Hungaria
- Ireland
- Italy
- Mozambique
- Netherlands
- New Zealand
- Norway
- Spain
- South Africa
- Switzerland
- Tunesia
- U.S.A.
- Western Germany

RESUMEE

Qualität macht sich bezahlt!

137 PLASSERMATICS wurden bis jetzt in folgende Länder verkauft:

- Österreich
- Australien
- British-Ostafrika
- Kanada
- Tschechoslowakei
- Dänemark
- England
- Frankreich
- Finnland
- Ungarn
- Irland
- Italien
- Mosambik
- Niederlande
- Neuseeland
- Norwegen
- Spanien
- Südafrika
- Schweiz
- Tunesien
- U.S.A.
- West-Deutschland

RÉSUMÉ

La qualité rapporte!

Jusqu'à ce jour 137 PLASSERMATICS ont été vendus dans les pays suivants:

- Autriche
- Australie
- Afrique Orientale Anglaise
- Canada
- Tchéchoslovaquie
- Danemark
- Grande-Bretagne
- France
- Finlande
- Hongrie
- Irlande
- Italie
- Mozambique
- Pays-Bas
- Nouvelle-Zélande
- Norvège
- Espagne
- Afrique du Sud
- Suisse
- Tunisie
- E.U.A.
- Allemagne Occidentale

Plasser & Theurer

WORLD REPORT CONTINUED

. . . The year 1960/61 has been the first in the history of Israeli Railways to end with an actual profit—250,000 I.L. The surplus has been attributed to the adoption of new working methods, overtime work, discharge of surplus personnel and sale of steam locomotives.

NEW ZEALAND: Sweeping changes to streamline the New Zealand Railways and promote more economical operation are part of a Government blue-print for an efficient co-ordinated rail and road transport system. Included in the reorganization are the closure of unprofitable branches, increases in suburban fare rates, reduction in certain freight rates and an extensive program of plant and equipment modernization. The Government has also relaxed restrictions on road transport of freight in order to make both forms of transport more competitive and create greater co-ordination between road and rail.

. . . The NZRs' 4300 ton roll-on, roll-off ferry, now under construction in Scotland, will operate between Wellington and Picton and will provide, in effect, a floating rail bridge between the two islands.

NORTH KOREA: The Korean war destroyed half the total of railway tracks, 70% of motive power, 65% of cars and over 90% of coaches. Since then, damage has been repaired and new lines laid. In 1959, freight traffic was 230% of the 1949 total, according to North Korean sources. About 167 km of track has been electrified. Plans for the future include further electrification, automatic signaling and communication and the laying of new lines.

NORTH VIETNAM: 580 km of track has recently been converted to standard 1.435-m gauge. Mainline railways now total 800 km. Rail freight traffic during 1960 amounted to 7.5 billion ton/km, some 59% of total freight movements. China has sent railway experts to modernize the network further and help build the 158-km line from Nam-Khan to Jen-Kiem, which will connect the North Vietnam and Chinese railways.

PEOPLES' REPUBLIC OF CHINA: According to a report published in the Russian economic journal "Ekonomiceskaia Gazeta", some 800 rail locomotives and 32,000 freight cars were built last year. These figures compare with a 1952 locomotive output of only 60 units and a 1958 production of 11,000 freight cars.

. . . By the end of 1959 the Peoples' Republic had a total rail network of 32,000 km. The 1960 plan to lay a further 4,300 km of track was not fulfilled owing to the call for labor to agriculture and steel production.

POLAND: It has been announced that the end of 1965 will see the opening of a large-capacity plant for the manufacture of engines for diesel locomotives. The new plant will form an extension of the present Cegielski works.

. . . The first prototype of heating and cooling units for electric locomotives and railcars has been produced by the electrical equipment works at Stettin; 3,800 such units are soon to be delivered to the Pafawag plant in Breslau. Until now all heating and cooling units have been imported from abroad.

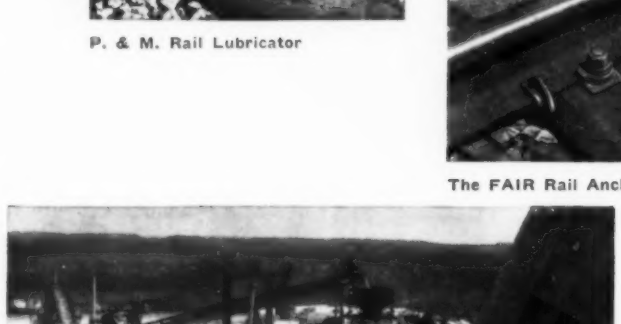
RHODESIA: The first major CTC installation in Northern Rhodesia came into operation last month. It forms part of Rhodesia Railways' £5 million program for the installation of CTC on the mainline from Umtali to Ndola—a distance of 1011 km.

CONTINUED ON PAGE 55

Wherever there are railroads

P. & M. Rail Lubricator

The FAIR Rail Anchor



A Pioneer portable rock crushing plant receives boulders for processing

International operations keep Poor & Company products available throughout the world

A railroad in England, Australia or India is just as near to a source of Poor & Company products as the carrier in Chicago, New York or San Francisco. This is possible through our world-wide facilities including subsidiary companies and dealer organizations in Canada, Mexico, Central America, South America, England, France, Africa, India and Australia.

From rail anchors and rail joints to draft gears and rail lubricators, Poor & Company products today are widely used by railroads big and small in all lands. These customers have come to look upon our services and products as essentials to modern railroading. We invite your inquiry at any time.

POOR & COMPANY

CHICAGO

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The P. & M. Co.	Kensington Steel
Maintenance Equipment Co.	Pioneer Engineering
Peerless Equipment	Canton Forge & Axle Works
Rail Joint Company	Rail Joint Reforming

SUBSIDIARIES Cie. des Appareils P. & M. (France), The P. & M. Co. (Australia) Pty. Ltd., The P. & M. Co. Limited (Canada), The P. & M. Co. (England) Ltd., The Rail Joint Company of Canada, Ltd.

(Advertisement)

RÉSUMÈ

Un chemin de fer en Australie est aussi proche d'une source d'approvisionnement de Poor & Company, qu'un train à New York. Ceci, grâce à nos entrepôts établis sur les cinq continents. Depuis des dispositifs d'angrace de rails et des joints de rails jusqu'aux engrenages de traction et aux graisseurs de rails, les produits de Poor & Company sont utilisés dans tous les pays. Nos services et nos produits sont considérés essentiels aux voies ferrées modernes. Consultez-nous!

RESUMEE

Jede Eisenbahn, ob in Australien oder New York, hat ein Bezugslager von Poor & Company in ihrer Nähe. Dies wird durch unsere auf den fünf Kontinenten vorhandenen Lager ermöglicht.
Von Schienenklemmen bis zu Schienenstössen, von Zuggetrieben bis zu Schienenschmierapparaten, — in allen Ländern werden diese Poor & Company Erzeugnisse von den Eisenbahnen verwendet.
Unsere Erzeugnisse werden als wesentliche Bestandteile der modernen Eisenbahnen angesehen. Wenden Sie sich an uns für weitere Auskunft!

RESUMEN

Dondequiera que haya ferrocarriles
la distribución internacional de los productos
de la Poor & Company cubre el mundo entero
Cualquier ferrocarril en Inglaterra, Australia o la India, puedo obtener los productos de la Poor & Company con la misma facilidad que los de Chicago, Nueva York o san Francisco. Esto es posible por la red internacional de esta firma, incluyendo subsidiarias y distribuidores en el Canadá, México, Centroamérica, Sudamérica, Inglaterra, Francia, Africa, India y Australia.
Los productos de la Poor & Company, ya sean anclajes y juntas de rieles o trenes de tracción y lubricadores, son extensamente usados por las empresas ferroviarias del mundo entero, las que han llegado a considerar nuestros productos y servicios como factores esenciales en los ferrocariles modernos. Pida información.

POOR & COMPANY
80 E. Jackson Boulevard
Chicago 4, Illinois

World Market

▶ *Australia*—The Western Australian Government Railways requires six Co-Co mixed traffic diesel-locomotives of approximately 1300–1400 hp. The Western Australian Government Railways is also seeking bids from manufacturers for the construction of 150 RCB-class bogie open gondola cars.

Commonwealth Railways has called for bids for standard gauge air-conditioned passenger rolling stock without bogies, including four or six coaches, one dining car and one or two first class lounge cars.

The State Electricity Commission of Victoria is calling for bids for three 60-ton Bo-Bo electric locomotives.

The Queensland Railways has placed orders with Commonwealth Engineering (Qld) Pty. Ltd. for the supply of 400 WHO-class bogie open wagons.

South Australian Railways has placed an order with A. E. Goodwin Ltd. of Sydney, NSW, for the manufacture of seven 900 hp Co-Co Goodwin-Alco diesel-electric locomotives.

▶ *Austria*—Austrian Federal Railways plan to place orders for 20 electric locomotives this year. The system is reported to also need 3,000 special goods wagons and a large number of passenger carriages.

▶ *Brazil*—The American Car and Foundry division of ACF Industries, Inc., is to supply Rede Ferroviaria Federal, S.A., with 18 multiple-unit electric cars. The $3,300,000 contract is being financed by the Export-Import Bank, USA, under an agreement through which the bank has made available $100 million to help Brazil modernize its rail system.

Among the projects under examination by Brazil's Federal Railway System is a plan for connecting the states of Sao Paulo, Parana, Santa Caterina and Rio Grande do Sul with a standard gauge railway. Cost of the project is estimated at 35 Mrd. Cruz. The question of electrifying the line is also under consideration.

▶ *Egypt (UAR)*—Bids are asked for the construction of three bridges: a steel double-track railway bridge, 323 m in length, across the Nile river (bid deadline 9 September); a double swing rail-highway bridge, 317 m, across the Suez Canal (bid deadline 3 October); and a rail-highway bridge, 755 m, across the Nile (bid deadline 28 September). Proposals being handled by General Manager, Egyptian Railways, Cairo Station, Cairo.

▶ *German Federal Railways*—The European Investment Bank has approved a loan of $25,000,000 to the Deutsche Bundesbahn for electrification of the major north-south line between Hanau and Gemueden.

Eurofima has raised a loan of 50,000,000 Swiss francs for the financing of orders by DB. The loan was granted by a Swiss bank consortium and the manufacturing concern of Brown, Boveri and Cie. AG, of Baden, Switzerland. It is initially in the form of a bank credit with a lifetime of 15 months; if, however, within this time the Railway places orders with Brown Boveri group after tender competition the credit life will be extended to ten years. It is foreseen that 30,000,000 francs worth of orders should be carried out in Switzerland and the rest by the German subsidiary of the Brown Boveri group.

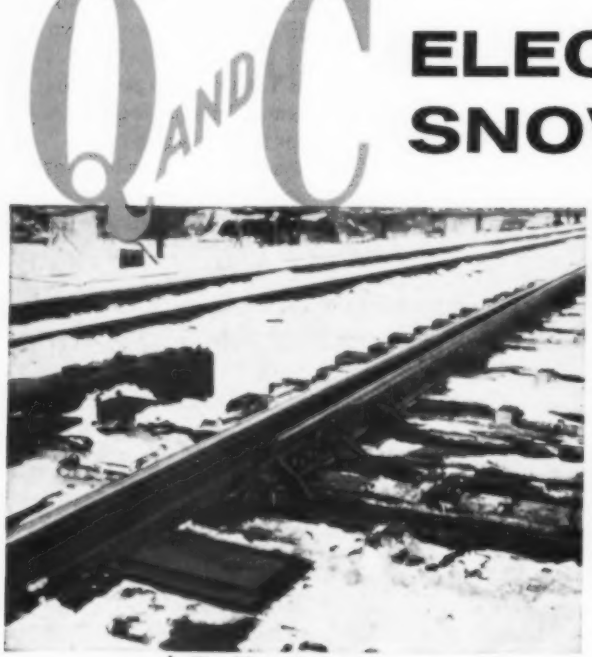
▶ *India*—Indian Railways have placed orders worth $1,245,000 with Sumitomo Metal Industries of Japan, for the supply of 15,000 completely assembled broad gauge wheel sets of 16-ton axle load, suitable for plain bearings.

A Belgian firm, Usines Emile Henricot, has been given orders for the supply of 400 Atlas Universal transition type couplers and 2186 Atlas

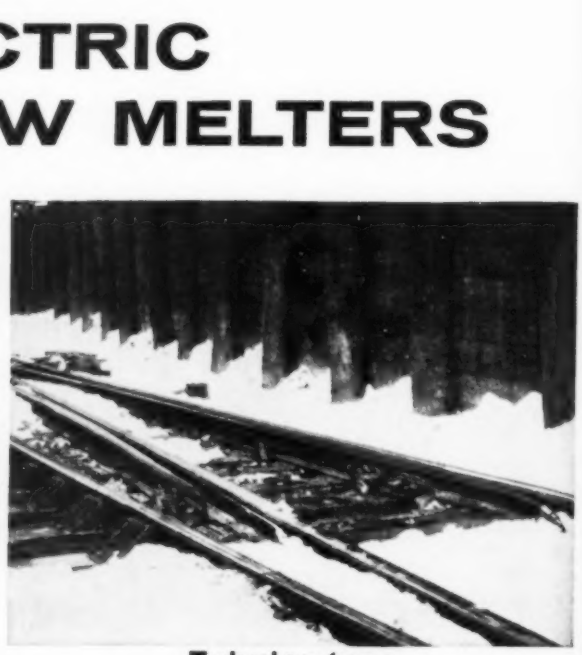
CONTINUED ON PAGE 21

Keep Switches Open during winter's worst storms

Q AND C ELECTRIC SNOW MELTERS



Ballast type



Tubular type

Compare the savings in time, money and convenience with Q and C Electric Snow Melters over other methods. Once installed, they can be centrally controlled and ready for immediate action at the first flurry of snow or freezing rain. Attention-free and weather-proof, they surpass all other clearing methods.

BALLAST units are placed in a series, loosely on the ballast under the switch points, close to base of the rail. They are furnished for either 47 or 55 volts, AC or DC, and can be placed on 110, 220, 440 or 660 volt circuits. Each unit consumes 1000 watts, and attains a temperature of 284 degrees in fifteen minutes with a maximum of 650 degrees in approximately an hour.

TUBULAR heaters are quickly and permanently attached to stock rails, between movable point and rail, assuring efficient placement of the heated zone. Heater element is enclosed in seamless stainless steel tubing, with brass terminal housing and moisture-proof fittings. Available for AC or DC. Insulated cable lead ten feet long furnished, unless otherwise requested. Wattage, voltage and length are supplied to your specifications.

Anyway you look at it, Q and C Electric Snow Melters are your dependable, winter-wise solution for snow-free switches.

Plan now . . . drop a line for our brochure giving information necessary for a complete Q and C Electric Snow Melter Installation.

THE Q AND C DIVISION

WESTERN RAILROAD SUPPLY COMPANY
2742 West 36th Place • Chicago 32, Illinois
Canada: Lyman Tube & Supply Company, Ltd., 5420 Pare Street, Montreal 9, Quebec

9979

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RÉSUMÉ

Aiguillages ouverts, même durant les pires tempêtes d'hiver.

Q et C: fondeurs de neiges électriques.

Type BALLAST et Type TUBULAIRE

Comparez les économies de temps et d'argent et l'accommodement offerts par les appareils électriques Q et C pour faire fondre la neige, avec les méthodes concurrentes. Une fois installés, ils sont commandés d'une centrale et prêts pour action immédiate à la première rafale de neige ou pluie glaciale. Ils ne demandent aucune surveillance et sont à l'épreuve des intempéries. Ils surpassent toutes les autres méthodes de dégagement. Les unités BALLAST se placent en série, sans être serrées, sur le ballast en-dessous des points d'aiguillage, près du patin du rail. Elles fonctionnent sur 47 ou 55 volts.

Les éléments de chauffage TUBULAIRES sont attachés rapidement et de façon permanente aux contre-aiguilles entre le point mobile et le rail, assurant un placement efficace de la zone chauffée. L'élément chauffant est enfermé dans un tube en acier inoxydable sans soudure, avec une boîte terminale en laiton et des garnitures résistant à l'humidité.

RESUMEE

Die Weichen bleiben, selbst im schwersten Wintersturm, offen!

Q und C Elektrische Schneeschmelzapparate.

BETTUNGSTYP und ROHRTYP

Vergleichen Sie die Zeit- und Geldersparnisse und die Bequemlichkeit der Q und C elektrischen Schneeschmelzapparate mit den sonstigen Methoden. Einmal installiert, können sie von einer Zentrale aus kontrolliert werden und sind beim ersten Schneegestöber oder Frostregen einsatzfertig. Sie erfordern keinerlei Pflege, sind wetterfest und übertreffen alle anderen Räumungsmethoden. Die Bettungseinheiten werden serienweise lose auf die Bettung und unter die Weichenstellen, dicht beim Schienenfuss, gelegt. Sie werden für 47 und 55 Volt geliefert.

Die röhrenförmigen Heizkörper werden schnell und dauerhaft an die Backenschienen zwischen den beweglichen Stellen und der Schiene befestigt und sichern ein wirksames Einlegen der geheizten Zone. Der Heizkörper ist in einem nahtfreien, rostfreien Stahlrohr mit einem Messing-Endgehäuse und feuchtigkeitsdichten Einlagen eingeschlossen.

RESUMEN

Mantenga los cambios abiertos aun en las peores tormentas invernales

Derritenieves eléctricos

Tipo DE BALASTO, Tipo TUBULAR

Compare el ahorro de tiempo, dinero y trabajo que los derritenieves eléctricos "Q and C" le ofrecen en comparación con otros métodos. Una vez instalados se pueden regular desde un punto central, siempre listos para entrar en acción a la menor señal de nieve o lluvia helada. Insuperables porque no requieren atención alguna y porque son a prueba de intemperie.

Las unidades para balasto se colocan en serie sobre el balasto, bajo las agujas del cambio, cerca de la base del riel. Vienen para 47 ó 55 voltios.

Los calentadores tubulares se conectan rápida y permanentemente a los rieles standard, entre la aguja movible y el riel, asegurando una ubicación perfecta de la zona de calor. El elemento calefactor está contenido en un tubo de acero inoxidable sin costuras, con cubiertas terminales de bronce y conexiones a prueba de humedad. Ambas unidades para CA o CC.

WESTERN Railroad Supply Company

World Market CONTINUED

IR type couplers. The orders are valued at Belgian Francs 8,370,000 and 33,227,200 respectively.

Servo Corporation of America has been awarded an $8,500,000 contract for CTC and hot box detector equipment.

▶ *Japan*—Bids are invited from qualified international contractors for the construction of steel bridges and other construction work on the new Tokaido line (IRJ, June 1961, p. 9). Contracts will be limited to firms qualified under JNR ruling.

▶ *Mozambique*—Bids have been invited by the Armazens Gerais Servicos dos Portos, Lourenço Marques, for 353 four-axle and 30 two-axle freight cars for general cargo, fruit and cattle transport.

▶ *Netherlands*—General Railway Signal Co, USA, and Nederlandsche Standard Electric Mij. N.V., a subsidiary of International Telephone and Telegraph Corp. have formed a new company, Algemene Sein Industrie, N.V. The company, with headquarters at The Hague, The Netherlands, will manufacture and market electronic and electric railway signaling and control systems and devices.

▶ *New Zealand*—Ministry of Railways, Wellington, N. Z., expects to call shortly for bids for the supply of 1,300 new freight cars, at a total estimated cost of approximately £2,750,000.

▶ *Norway*—A contract for 90 subway cars for the new Oslo subway has been awarded to the Norwegian firm of Strømmens Verksted A/S. Total value of the purchase is approximately $10,000,000 (US).

▶ *Pakistan*—Metropolitan-Cammell of Birmingham, England, has obtained its seventh freight car contract in 10 years from Pakistan. The latest order is for 1000 four-wheeled, all-steel covered cars for Pakistan Eastern Railways.

▶ *Poland*—The Polish Government recently signed a trade agreement with the Peoples' Republic of China which calls for the supply of various heavy industrial goods, including railway locomotives.

▶ *Sweden*—A road and railway bridge across the Sound between Sweden and Denmark is under consideration. Final cost would be in the region of $200,000,000 (US).

▶ *Swiss Federal Railways*—The Administrative Council has approved expenditures of 43,200,000 francs for the purchase of 36 2800-hp electric railcars; 11,800,000 francs for ten Bm 4/4 diesel-electric locomotives; and 18,000,000 francs for the purchase of 575 freight cars.

▶ *Thailand*—The State Railway has invited bids, until 25 September, for three royal salon railway cars.

▶ *Viet Nam*—South Vietnamese Railways have ordered 23 diesel-electric locomotives and 46 rail wagons from the US, with credit of $9,700,000 supplied by the Development Loan Fund.

▶ *Indonesia*—A new purchase program, listed on page 25, is embraced in a Seven-Year Plan recently announced. Cost of the items to be acquired is estimated at $460,281,997 (US), plus NF Fr. 14,207,000 and DM. 35,000. The latter expenditures are listed specifically in connection with machines and equipment for concrete sleeper construction.

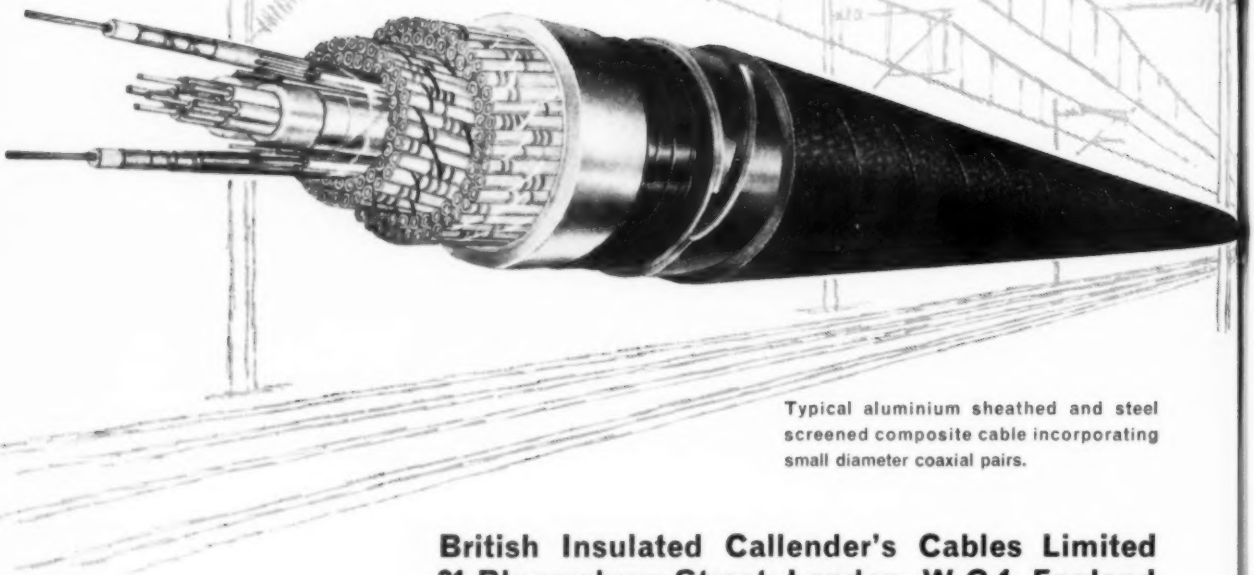
No announcement has yet been made as to how this major program will be financed. Details of the program are being handled in Indonesia by Mr. Tedjo Masman, N.V. Kemenangan, 75 Djalan Gunung Sahari, Djakarta.

CONTINUED ON PAGE 25

BICC Telecommunication Cables

for Railway Modernization

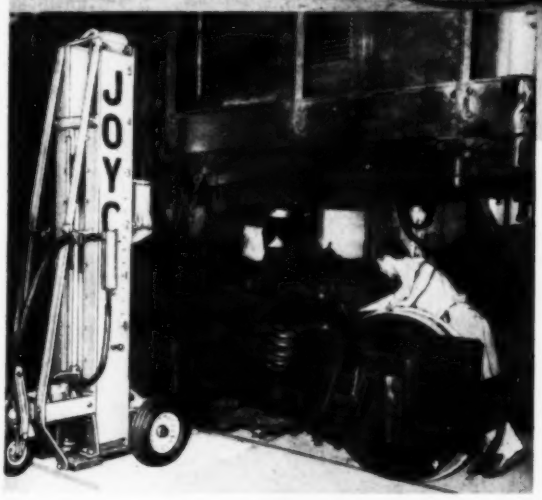
BICC are specialists in the design of screened cable systems for use in the difficult induction environment of A.C. electrification. Modern railway communications demand increasing bandwidth for long distance circuits—BICC small diameter coaxial pairs meet this demand. Detailed information is available on request. Publication 437 describes BICC standard screening designs and their applications. Publication 422 gives details of small diameter coaxial cable designs including composite types.



Typical aluminium sheathed and steel screened composite cable incorporating small diameter coaxial pairs.

British Insulated Callender's Cables Limited
21 Bloomsbury Street, London, W.C.1, England

branches and agents throughout the World



Four synchronized Joyce 35-AHL Jacks lift diesel locomotive free of trucks. Air operation through multiple-valve arrangement assures level rise.

Closer view shows how locomotive body can be lifted entirely off trucks. Four jacks could also be used to lift locomotive, trucks and all, entirely off track.

JOYCE ALUMINUM, AIR-OPERATED SHOP JACKS

speed service on diesel locomotives and all railroad cars

A satisfied customer states:
"... the Joyce Model 35-AHL compressed air jacks each of 35 tons capacity, which we purchased, are fulfilling expectations and are perfectly adapted to the services to which they have been put on this railroad."
Oscar Funes
Ing. Sub-Jefe del Departamento de Locomotoras
ESTRADA DE FERRO ARARAQUARA

Features of joyce 35-AHL jacks:

One-Man Operation... lightweight aluminum alloy construction saves weight. Three wheels equipped with semi-pneumatic tires make trundling and positioning of the jack an easy one-man job.

Air Motor Operated... for safety, convenience and labor savings.

Can be Synchronized... jacks can be used singly... or 2, 3, or 4 jacks can be synchronized through multiple-valve arrangement for positive level lifting.

Built-In Safety... jack stops automatically at top and bottom of rise... automatically locks under load in case of air failure. Low center of gravity gives jack excellent stability.

Specifications... 35 tons capacity... 4 ft. $4^1/_2$ inches rise... weight 1620 pounds .. operates on 90 PSI pressure.

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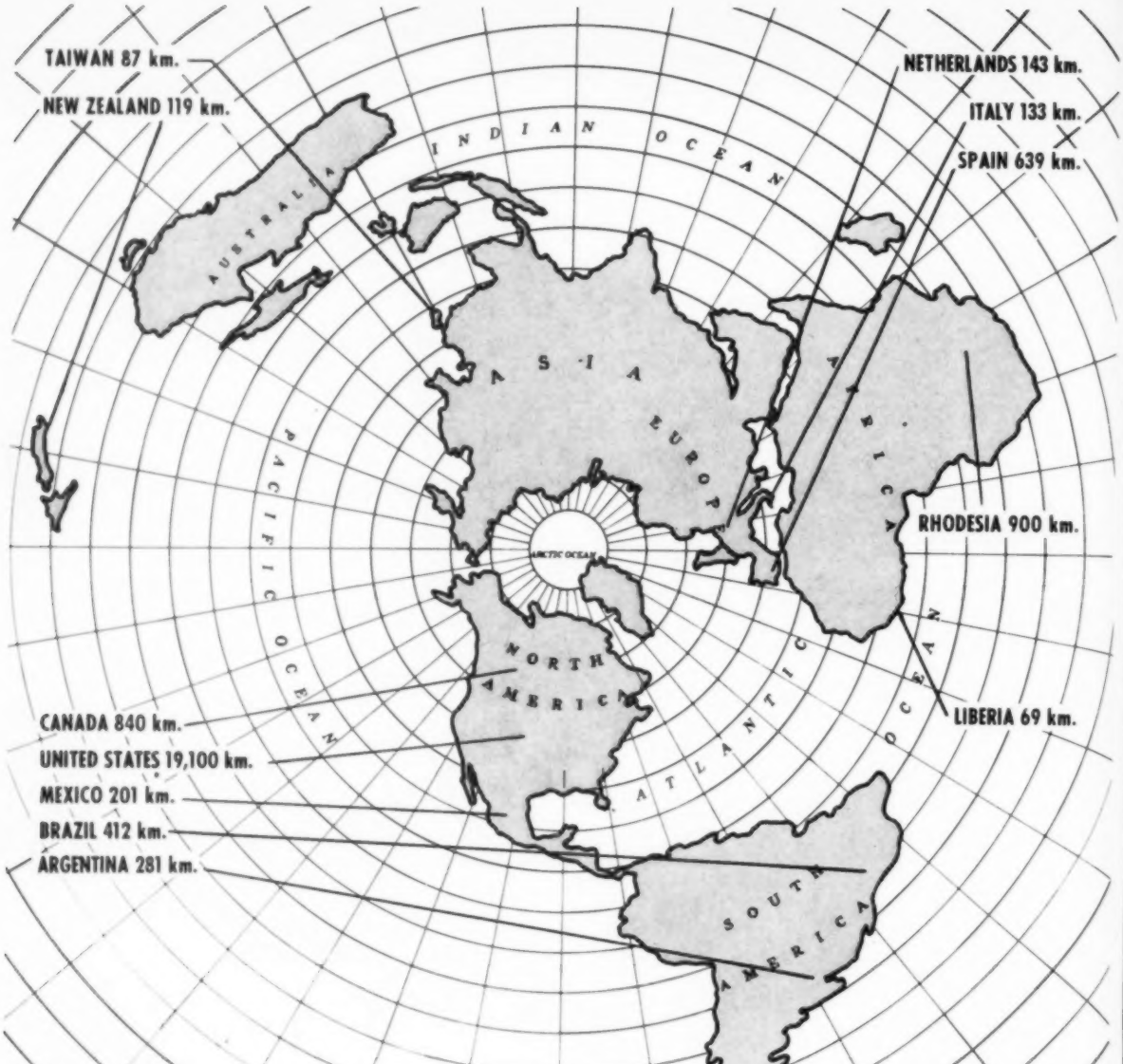

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RÉSUMÉ

Le soleil ne se couche jamais sur les „cTc" de GRS

La commande centralisée de la circulation de GRS est reconnue par les chemins de fer de nombreux pays comme le meilleur moyen d'obtenir une exploitation efficace et sûre du trafic ferroviaire.

Avantages d'Exploitation de la „cTc"

cTc réduit le temps de parcours;
cTc augmente la capacité de la ligne;
cTc accroit la flexibilité de l'exploitation;
cTc augmente les kilomètres-tonne brute par heure-train;
cTc augmente la disponibilité des wagons, des locomotives et du personnel roulant;
cTc accélère le trafic quelle que soit sa nature, sa condition, le temps ou l'ordre dans lequel il entre dans le territoire de la cTc;
cTc est beaucoup plus économique à installer et maintenir que des voies supplémentaires;
cTc augmente la sécurité.

RESUMEE

Die Sonne geht niemals über GRS "cTc" unter.

Die GRS Fernsteuerung ist das beste Mittel für eine wirksame und sichere Zugbetriebsführung und wird von den Eisenbahnen vieler Länder als solches anerkannt.

"cTc" Betriebsvorteile

cTc kürzt die Fahrtdauer;
cTc erhöht die Leistungsfähigkeit der Strecke;
cTc erhöht die Betriebungsmöglichkeiten;
cTc vermehrt die Bruttotonnen-Kilometer per Zug-Stunde;
cTc macht Wagen, Lokomotiven und Zug-personal schneller verfügbar;
cTc beschleunigt den Verkehr jeder Art, was auch immer die Bedingungen, die Zeit und die Fahrtordnung im Fernsteuerungsgebiet sein mögen;
cTc ist in der Installation und der Unterhaltung viel wirtschaftlicher als zusätzliche Gleise;
cTc erhöht die Sicherheit des Bahnbetriebs.

RESUMEN

El sol siempre brilla sobre los sistemas cTc de la GRS

Los ferrocarriles de numerosas naciones en todo el mundo reconocen que el Control Centralizado de Tráfico de la GRS es el mejor medio de obtener un transporte seguro y eficiente por ferrocarril.

Ventajas de operacion del cTc

El cTc reduce el tiempo del tren en ruta;
El cTc aumenta la capacidad de la vía;
El cTc da mayor flexibilidad a la operación;
El cTc aumenta las toneladas-millas brutas por tren-hora;
El cTc permite mayor utilización de los vagones, locomotoras y cuadrillas;
El cTc expedita el tráfico sea cual sea la naturaleza, el tiempo, las condiciones o el orden en que los trenes entran en el territorio con cTc;
El cTc es mucho más económico de instalar y mantener que si se ponen vías adicionales
El cTc aumenta la seguridad de operación de los trenes.

TOOLS FOR TRANSPORTATION GRS

World Market CONTINUED

Indonesia's Seven-Year Plan

1. For traction services

		Est. Prices C&F	
80 diesel locomotives 1300 hp	@ US$	200,000	
60 diesel locomotives 1000 hp	„ „	178,000	
100 diesel locomotives 750 hp	„ „	126,000	
175 diesel locomotives 350 hp	„ „	100,000	
75 diesel locomotives 250 hp	„ „	63,000	
51 steam locomotives	„ „	165,000	Total estimated price
10 passenger electric cars	„ „	500,000	C&F US$ 419,075,000
80 passenger diesel cars	„ „	60,000	
5340 passenger cars/spare parts	„ „	40,000	
30520 freight wagons/spare parts	„ „	4,000	
550 machines for work-shop	„ „	6,000	
3 boats for mining	„ „	125,000	

2. For way and construction services

a. Replacement of rail 14.— required			
145,660 tons rail 14	@ US$	160,—	
58,759 tons subsidiary iron materials	„ „	130,—	Total estimated price
586 ordinary switches	„ „	2,140,—	C&F US$ 32,690,320
57 English switches	„ „	4,880,—	
34 crossings	„ „	1,125,—	
b. Emplacement works			
4,150 tons rails	„ „	160,—	
1,800 tons subsidiary iron materials	„ „	130,—	Total estimated price C&F US$ 1,248,920
1,330 tons switches	„ „	250,—	
c. Ranger tracks works			
666 tons rails	„ „	160,—	
285 tons subsidiary iron materials	„ „	130,—	Total estimated price C&F US$ 281,110
550 tons switches	„ „	250,—	
d. Launch tracks works			
5,440 tons rails	„ „	160,—	
2,340 tons subsidiary iron materials	„ „	130,—	Total estimated price C&F US$ 2,424,600
5,000 tons switches	„ „	250,—	
e. Work-shop for way and construction services 3 equipment	„ „	75,000,—	Total estimated price C&F US$ 225,000
f. Protection works			
Purchase for Siemens & Halske equipment	US$	86,531	
Purchase for block wires	„	32,700	
Purchase for all relay interlocking & automatic shunting equipment	„	3,295,816	Total estimated price C&F US$ 4,214,047
Work-shop equipment for signal & telegraph dept.	„	800,000	

3. For supply services

1 Unit mechanization machine	US$	67,000	Total estimated price
Machines for material tester	„	56,000	C&F US$ 123,000

Resume of plan of foreign purchases in 7-Year Plan:

1.	US$ 419,075,000		
2.	US$ 41,083,997	F.Fr. 14,207,000	DM. 35,000
3.	US$ 123,000		
1/2/3	= US$ 460,281,997	F.Fr. 14,207,000	DM. 35,000

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1

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3

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2 **A-120-P Draft Gear** used in combination with B-18 type buffer where hook coupling is used, either with yoke application or with pull rod through the gear.

3 **A-22-SAXL Draft Gear.** Thousands have been applied throughout the world where center automatic couplers are used.

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K-M's "Biggest" Goes to the US

With the accelerating trend toward dieselization of the world's railways, the older diesel-electric locomotive has faced increasing competition from the newer diesel-hydraulic. Pioneered in Germany, the hydrodynamic transmission has earned a solid place in the shunting and railcar field. More recently, diesel-hydraulic road-service locomotives with outputs at the engine of up to 3000 hp have made their appearance.

Altogether, diesel-hydraulics have risen in ten years from 4% to 17% of the total diesel units in service, and are in service in practically every nation in the world. A conspicuous holdout against the trend has been the US, the citadel of diesel-electric power. It is not surprising, therefore, that the decision of two US railways to order diesel-hydraulics from Germany's Krauss-Maffei—and more powerful units than ever before constructed, at that—caused a good many raised eyebrows in railway circles, both in the US and abroad. As this issue of IRJ goes to press, the six 4000-hp road units were due to be shipped from Bremen. The question now is how the imports will stack up against domestic US diesel electrics once they reach their destination. In July IRJ editors spent a week in Austria, watching Krauss-Maffei and US engineers put one of the new units through its paces on the rugged Semmering grade. Here's how the performance looked.

Krauss Maffei 4000-hp C-C diesel-hydraulic successfully passed initial tests at Semmering

"During the tests the locomotives have performed just as we expected them to; what we need now is experience." The comment, by Southern Pacific Vice President W. D. Lamprecht, essentially summed up official reaction of SP and Denver & Rio Grande Western observers to the 3-7 July tests of Krauss-Maffei's 4000-hp diesel-hydraulic road locomotive on Austria's rugged Semmering Pass.

Apart from the official observations, there was plenty of indication that the hefty locomotives will live up to the reputation of their German predecessors in the diesel-hydraulic field. The SP and D&RGW have each ordered three of the locomotives.

During the tests, the big red-and-gray C-C locomotive, fourth off the line and first of the SP's three units, made five round trips over the Semmering's 2.5% grades. It hauled scheduled freight trains of the Austrian Federal Railways while US and European observers packed the cab, the engine room, and the attached dynamometer car, watching the locomotive run through its paces. The performance was impressive.

The Semmering itself is as close to conditions under which the locomotives will operate in the US as it's possible to find in Europe. With a ruling grade of 2.52% boosted to the equivalent of 2.7% by sharp, uncompensated curves, the 30-km north ramp was the main testing ground for both pulling and braking power.

Trains hauled in each of the ten tests (five in each direction) averaged about 950 US tons. They ranged from 70 to 90 axles almost entirely composed of two-axle cars. Differences in car design—fewer tons per axle, side buffers, longer rigid wheelbase and the almost universal use of roller bearings—make exact comparison with US trains difficult where actual running resistance is concerned. But Krauss-Maffei's engineers calculate a running resistance somewhat higher than an equivalent tonnage in US bogie cars.

Performance was further affected by the restrictions of Austrian axle-loading limitations. The locomotives—with a design weight in working order of 150 metric tons—were held down to 138 tons, carrying only about 660 US gallons of fuel (compared with a tank capacity of 3,280).

Within these limitations, K-M's advance calculation of expected performance gave an estimated speed of 24 km/h for the most difficult section of the line with a train of 875 tons. Actual performance either held the line or exceeded it, the locomotive holding a speed of 25–32 km/h over the toughest section from Payerbach-Reichenau to Semmering.

The only slippage occurred on wet track after a night of rain. SP and Rio Grande observers later commented that the slippage, even under these conditions, and with the automatic sanders disconnected, was not severe enough to be important.

CONTINUED

Locomotives diesel-hydrauliques de 4000 CV

La tendance croissante de tous les réseaux ferrés du monde à passer à la traction diesel stimule la concurrence entre constructeurs de machines diesel-électriques, d'une part, et constructeurs de machines diesel-hydrauliques les plus modernes, d'autre part. La transmission hydrodynamique de la force, développée en Allemagne, s'est assuré une place de choix dans le domaine des véhicules moteurs de manoeuvre et des automotrices; elle tend aussi à s'imposer de façon remarquable dans le secteur des véhicules moteurs lourds. Ces dix dernières années, la proportion des machines diesel-hydrauliques dans le monde a passé de 4 à 17% du parc des véhicules moteurs diesel. Jusqu'ici, les Etats-Unis, citadelle de la traction diesel-électrique, étaient très réservés à l'égard de l'énergie diesel-hydraulique. La décision des chemins de fer Southern Pacific et Denver and Rio Grande de commander chez Krauss-Maffei, en Allemagne, six locomotives diesel-hydrauliques est, par conséquent, de nature à éveiller un vif intérêt en Amérique et dans d'autres pays. Des reporters de l'"International Railway Journal" ont assisté, en juillet, aux courses d'essai d'une machine Krauss-Maffei au col du Semmering, en Autriche. Durant une semaine, la grande locomotive C-C a remorqué des trains de marchandises des Chemins de fer fédéraux autrichiens en cinq courses circulaires sur les rampes de 2.5% du Semmering. On a spécialement remarqué la puissance du système de freinage hydrodynamique Voith de la locomotive, utilisé pour la première fois en corrélation avec l'hydrodynamique diesel.

Erste 4000-PS-Diesel-Hydraulik

Mit der steigenden Tendenz aller Eisenbahnen der Welt, zur Dieseltraktion überzugehen, nimmt der Wettbewerb zwischen der dieselelektrischen und der neueren dieselhydraulischen Krafterzeugung entsprechend zu. Die in Deutschland entwickelte hydrodynamische Kraftübertragung eroberte sich einen festen Platz auf dem Gebiete der Rangierfahrzeuge und Triebwagen und verspricht, ebenso bemerkbar in den Sektor schwererer Triebfahrzeuge einzudringen. Während der letzten 10 Jahre erhöhte sich der Anteil der dieselhydraulischen Maschinen am gesamten Dieseltriebfahrzeugpark der Welt von 4% auf 17%. Besonders zurückhaltend verhielten sich bis heute die USA, die Hochburg der dieselelektrischen Zugförderung. Der Entschluss der Southern Pacific und der Denver and Rio Grande Eisenbahnen, bei Krauss-Maffei in Deutschland sechs dieselhydraulische Lokomotiven zu bestellen, erweckte deshalb in den USA und in andern Ländern ein lebhaftes Interesse. Reporter des International Railway Journal haben im Juli den Probefahrten einer Krauss-Maffei-Einheit auf dem Semmeringpass in Oesterreich beigewohnt. Während einer Woche führte die grosse C-C-Lokomotive Güterzüge der Oesterreichischen Bundesbahnen in fünf Rundfahrten über die 2.5%-Steigungen des Semmerings. Besondere Beachtung fand die Leistung des hydrodynamischen Voith-Bremssystems der Lokomotive, das hier zum ersten Mal in Verbindung mit Dieselhydrodynamik verwendet wurde.

Nuevas diesel-hidráulicas de 4000 C.V.

Adelantando más y más la dieselización de los ferrocarriles del mundo, la diesel-eléctrica está afrontando la competencia creciente de la diesel-hidráulica. La transmisión hidrodinámica, introducida en Alemania, se ha plantado firmemente en los campos de locomotoras de maniobras y de autorieles y promete hoy una competición escarnizada en el campo de locomotoras pesadas. En los últimos diez años el número de diesel-hidráulicas ha subido del 4% al 17% del total de unidades diesel que sirven en los ferrocarriles del mundo. Hasta aquí los EE.UU., patria de la tracción diesel-eléctrica, se ha mantenido firme. Por eso, el hecho de que dos ferrocarriles de los EE.UU.—el Southern Pacific y el Denver y Rio Grande—han comprado seis diesel-hidráulicas de 4.000 C.V. a la casa alemana de Krauss-Maffei, ha suscitado mucho interés. En julio la International Railway Journal informó sobre los ensayos en el paso Semmering en Austria. Durante una semana la locomotora C-C hizo cinco vueltas en las pendientes de 2.5% del Semmering arrastrando trenes de carga de los FF.CC. Federales de Austria. Se observó con mucha atención el funcionamiento del freno hidrodinámico Voith, el primer freno dinámico aplicado a una diesel-hidráulica.

K-M's "BIGGEST" CONTINUED

Especially impressive was the comparison with normal motive-power practice on the Semmering. The K-M locomotive, with a horsepower of just over 3,000 at the transmission output shafts, held almost exactly to scheduled times with trains normally handled by two electrics—a C-C and a B-B—with ten axles and a total output of 8,600 hp at the axles.

Even more closely watched than the pulling power was the performance of the Voith hydrodynamic braking system, said to be the first dynamic brake ever applied to a diesel-hydraulic. Dynamic braking held the train to the prescribed 30 to 35 km/h limits consistently on the steepest downgrades. The Westinghouse air brakes were used only for full stopping and with light applications at two or three spots where track maintenance imposed slow orders.

Prime movers for the locomotive are two Maybach MD 870 16-cylinder engines of the firm's "tunnel" design—disc-shaped crank webs each carrying SKF cylindrical main roller bearings whose outer races are mounted on the annular crankcase walls.

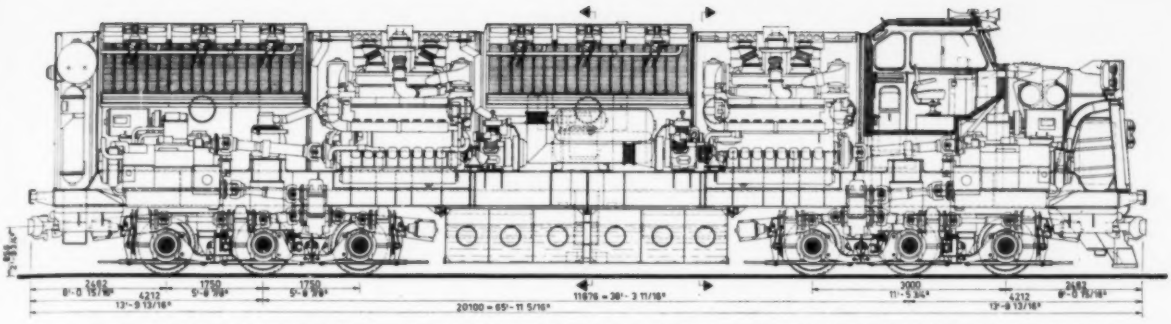
Each V-16 4-cycle engine is pressure-charged and equipped with intercooling for maximum output at 1,500 rpm. The engines have a continuous rating of 2,000 hp at 1,585 rpm under standard International Railway Union (UIC) conditions (atmospheric pressure 14.23 psi at 20° C). Rated power for site conditions at Semmering was 1,900 hp gross, with an input to the hydraulic transmission of 1,770 hp.

The engines have the same bore and stroke—185 by 200 mm—as other Maybach MD engines. Pistons are of the divided type and are pressure-oil-cooled through telescoping piping within the engine, with a special heat exchanger provided for the piston-cooling oil.

The builder claims the oil-cooling of the pistons permits the reduction of piston clearance during installation, resulting in a reduced rate of wear, and cites a liner wear rate of only .006 mm per 1,000 operating hours observed in German Transport Ministry tests.

Engines are started electrically by a starter-generator attached to each Voith transmission, driving through an elastic coupling and gear step to the transmission input shaft and thus to the engine. Each engine has its own radiator group, consisting of a V-shaped radiator bank through which air is pulled from side louvers and exhausted through the roof.

The three fans for each radiator are hydrostatically driven by multi-piston oil pumps and oil motors connected to the



Arrangement of Krauss-Maffei diesel-hydraulic as built for the Southern Pacific and Denver & Rio Grande Western Railroads, USA.

fans by V-belts. Pressure in the hydrostatic line (and thus fan speed) is controlled by the temperature of the cooling water, through a thermostat and bypass.

The main cooling-water circuit runs through the radiator, the engine block and the heat exchangers serving the transmission, hydrodynamic brake and engine lubricating oil. A secondary circuit serves the intercooler for the charging air exclusively.

To improve cooling in tunnels where available air has been heated by exhaust gasses, each radiator is fitted with a water-spray system which sprays the entire cooling surface. Combustion air for the engines passes over plate-type and oil-bath filters through openings in the side walls. Each engine has an oil-fired pre-heater which works through the cooling-water system.

Heart of the locomotive is the hydraulic transmission. The 4,000-hp unit uses a fully hydrodynamic drive, the Voith Turbo Transmission type L830rU, with three Föttinger-type torque converters, built-in reversing gear and attached hydrodynamic brake, one transmission for each engine and bogie. Each of the three converters, consisting of the driving pump impeller, driven turbine runner and a fixed stator or guide ring, has blading designed for a different speed-torque range. This differs from previous Voith transmissions, in which the medium- and high-speed converters were identical, the third stage driving the output shaft through step-up gearing.

Changes of operating range are carried out hydraulically through an automatic control system which fills the appropriate converter in response to track speed and engine rpm. The emptying and filling of the converters is overlapped during changeover to eliminate power loss. During the Semmering tests changeover could be spotted on the recording instruments in the dynamometer car, but was virtually impossible to sense otherwise.

In the informal discussions following each day's tests attention turned on several occasions to the relative merits of the Voith all-hydraulic transmission and the Maybach-built Mekydro transmission, which uses a single, permanently-filled converter with an automatic mechanical gearbox. Both have their supporters. Both Mekydro and Voith transmissions are used by the German Federal in the 2,200-hp V-200 road locomotive.

Since full interchangeability was a design requirement, it is not unusual to find a V-200 operating with one transmission of each type in service. Mekydro drives were used in both of the K-M locomotives whose development led to the 4,000-hp units, the 2,200-hp C-C units built for Yugoslavia, and K-M's own 3,000-hp C-C demonstrator. They were also used in the Baldwin-built locomotives for the New York Central and New Haven "Train X" lightweight trainsets in the US.

Voith drives, on the other hand, have been specified not only for the US-destined 4,000-hp locomotives but also for three 2,700-hp center-cab C-C locomotives being built for Turkey.

It was hard to find agreement on the subject, but the feeling among US observers seemed to be that the Voith, though perhaps slightly less efficient, would present fewer maintenance problems. The Voith hydrodynamic brakes, designed to be used with Voith transmissions, were another factor, though Maybach is reported to have its own dynamic brake design.

The braking system, which attracted much attention during the tests, is based on the principle of the Froude "water brake," in which energy is dissipated in the form of eddy formation and heat. The brake itself consists of a double-entry rotor, attached directly to the output shaft of the Voith drive transmission, and a fixed stator with two bladings to match the double-entry rotor. Braking is controlled by the filling and emptying of the hydraulic circuit.

Eight braking steps—corresponding to different fillings of the circuit—are available. Oil is fed to the brake by the main transmission filling pump through the open duplex non-return valve, the heat exchanger, and the braking valve. Once filled, the duplex valve closes and the oil circulates in a brake-exchanger-brake circuit. Heat generated during braking is dissipated through the heat-exchanger to the engine cooling-water circuit and thence through the main radiators, which otherwise provide cooling for both engine and transmission oil. During braking, the engine, which has a normal idling speed of 600 rpm, automatically steps up to 900 rpm to provide increased ventilation and circulation in the cooling circuits.

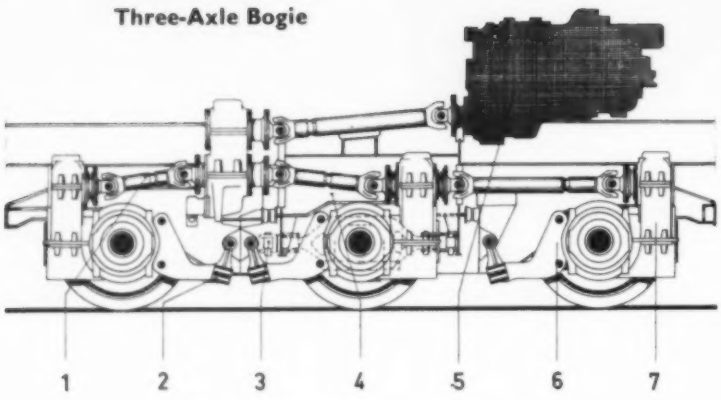
Regulation of the brake filling is carried out through an eight-step valve which varies the cross-sectional areas of the brake's inlet and outlet, forming a shunt circuit; the brake-control valve is operated by the main throttle handle. Since heat dissipation and torque considerations place a well-defined limit on the amount of energy the brake can absorb, a filling-limit valve keeps the filling of the brake within set limits. In addition it serves as a relief valve, allowing surplus oil to escape when oil pressure within the brake reaches a preset maximum.

From each transmission, power is taken to an intermediate gear built by K-M and attached to the bogie frame, consisting of a spur-gear pair with a one-sided top input and bilateral take-off underneath. Final drive is through Maybach type C 33 vI bevel-gear and spur-gear axle drives. Between components, power is transmitted by universal-jointed Cardan shafts. Except for needle bearings in the Cardan shafts, all bearings in the motor and drive train are SKF cylindrical roller units. The bearings are all standard SKF catalog items. Most are interchangeable with standard bearings of other makes.

The bogies are of a special design which is made necessary by the Cardan-shaft drive. A lever and rod system attached partly to the bogie frame and partly to the main frame extension replaces a center pivot, guiding the bogie

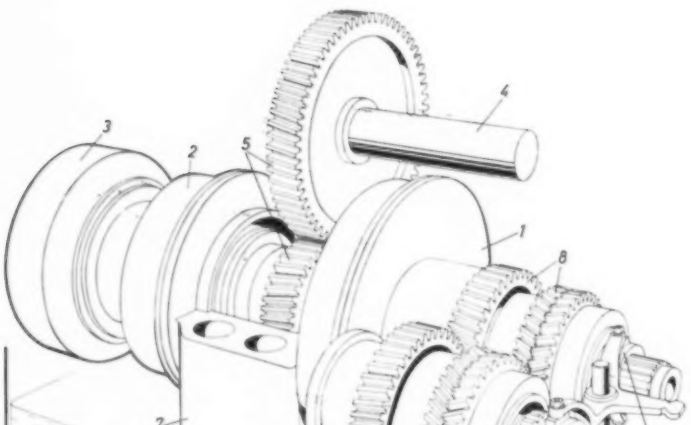
CONTINUED

Three-Axle Bogie



1 Cardan shaft
2 Suspension elements of torque support
3 Guide linkage
4 Projection of the main frame
5 Hydraulic transmission gear
6 Torque support
7 Axle bevel drive

Voith Turbo Transmission Type L 830 rU



1 Hydraulic circuit
2 Ditto
3 Ditto
4 Input shaft
5 Step-up gear
6 Filling pump
7 Distributing piston valve
8 Reversing spur gear
9 Reversing clutch
10 Output shaft

K-M's "BIGGEST" CONTINUED

frame around its theoretical center. Of all-welded block-type construction, the bogie assembly incorporates elastic Silentbloc joints wherever possible, not only cushioning shocks but reducing maintenance. Longitudinal pulling and brake forces are transmitted from the bogie to the main frame by manganese hard steel liners.

Vertical loads are carried in two steps. The main frame rests, through rubber bolsters, on four cross members which are suspended in turn from the cantilevers of the bogie frame by spring tensioning screws and helical springs. The bogie suspension is relatively soft, while the direct springing between axleboxes and bogie frames has a higher rigidity. The design of the springing is intended to prevent excess rolling.

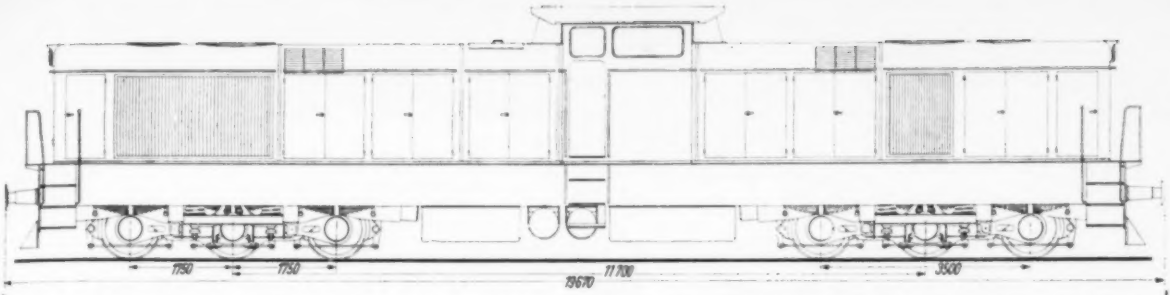
A main point of departure from usual European diesel practice is the heavy mainframe of the 4,000-hp locomotive. Previous designs have used the body shell as a structural element, and main frames are normally designed to withstand buffing forces of no more than 200 metric tons. Specifications for the SP and Rio Grande units, however, called for a million-pound buffing strength at the drawbars. The result is an electrically-welded frame consisting of two continuous wide-flanged I-beams connected at the bolsters and under the engines by heavy built-up crossbearers. End members are cast-steel pieces incorporating coupler pockets.

A finished frame was subjected to the specified 454 metric ton, compressive force at the coupler pockets. In spite of distortion of several centimeters at the frame center, lasting distortion was less than .5 mm.

The frames carry AAR type E bottom-operated couplers with type M-380 draft gear. For testing in Europe special built-up T-shape drawbars were fitted, with solid unsprung side buffers and center drawhook.

The superstructure is a US-European hybrid in style, the US features being in some ways a blend of Alco and Electro-Motive stylings. Most obvious European feature is the pronounced inward slope of the upper portion of the cab and body sides, made necessary by the need to perform tests under European clearance conditions. This feature of the design provoked some criticism by US operating men during the tests.

The locomotive features a broken roof line, the engine room roof being slightly lower than the cab roof. The chief reason for this was to provide extra space for exhaust stacks, allowing a lower temper-



Several of the design features found in the US-ordered 4000-hp locomotives have been incorporated in three 2700-hp units now building in Krauss-Maffei's Munich works for the Turkish State Railways.

Like the 4000-hp units and 73 2700-hp road locomotives being built under K-M license in Great Britain, the TCCD units derive directly from the six-axle locomotives built by Krauss-Maffei for Yugoslavia (three 2200-hp units) and from its own experimental research (one unit identical to the Yugoslav type, later rebuilt to 3000-hp).

The Turkish locomotives incorporate Maybach engines (the twelve-cylinder MD 655, derated to 1350hp for altitude and climate conditions) with turbocharging and intercooling, Voith all-hydraulic transmissions, and the Voith hydrodynamic brake. The three-axle bogies are basically identical to those of the ML 3000, and the locomotive has an axle-loading of 18.5 tons.

Chief point of departure from previous K-M locomotives is in the superstructure. Rather than the double-ended design used in Germany, the TCCD units have a single center cab and engine hoods of the "road-switcher" type, with outside walkways. Layout of the powerplant components is symmetrical; provision for a centrally-located train-heating boiler results in the cab being slightly off-center. The elevated cab and narrow engine hoods provide full all-around vision for the driver, including a sufficient view of the buffers for shunting operations.

Since the superstructure design does not permit its use as a structural element, the main frame (like those on the 4000-hp units) has been made heavy to carry the entire structural load.

ature of the air taken in for cooling and combustion under close tunnel conditions. Small rear windows have been provided in the cab, permitting easy observation of exhaust gasses.

The superstructure consists of four separate sections: nose, cab and two engine-room sections. Nose and engine-room sections are solidly bolted to the frame, while the cab rests on rubber cones.

The four sections are insulated and weatherproofed by rubber profiles fitted at the joints. All four sections consist of formed sectional steel framing onto which the outer walls are spot-welded. The inner sides of the engine-room walls are covered with sprayed-on acoustical material. The cab is double-walled, the space between outer walls and perforated inner metal sheeting being filled with stone wool. This acoustical treatment, combined with the rubber-cushioned mounting, results in an unusually quiet cab interior.

Roof hatches are provided for removal of the engines, front starter-generator, and the Cardan shaft passing under the cab floor. The two complete cooler plants in the engine-room roof are removable.

The "amenities" furnished for the crew are luxurious by European standards, but normal for modern US motive power; comfortably-upholstered adjustable seats for driver, fireman and head brakeman; cab heating and ventilation equipment; drinking water, cooler and flush toilet.

The locomotive is equipped with a Westinghouse 26L air brake system, supplied by a three-cylinder 3CDCB compressor driven by each engine on the end opposite the drive output through V-belts. With an output of 6.371 cu. dec./min. each at 1,000 rpm, the compressors feed the two main air reservoirs, which have a total capacity of 800 liters. The air system also supplies the pneumatic control equipment and various air-operated auxiliary equipment. All wheels are fitted with clasp brakes, with individual cylinders for each wheel. A hand brake on the rear cab wall acts on one wheel of the front bogie only.

Two 64-volt lead batteries are provided, each with a 385-ampere/hour capacity. They supply control circuits, lighting, and auxiliaries, as well as providing starting power.

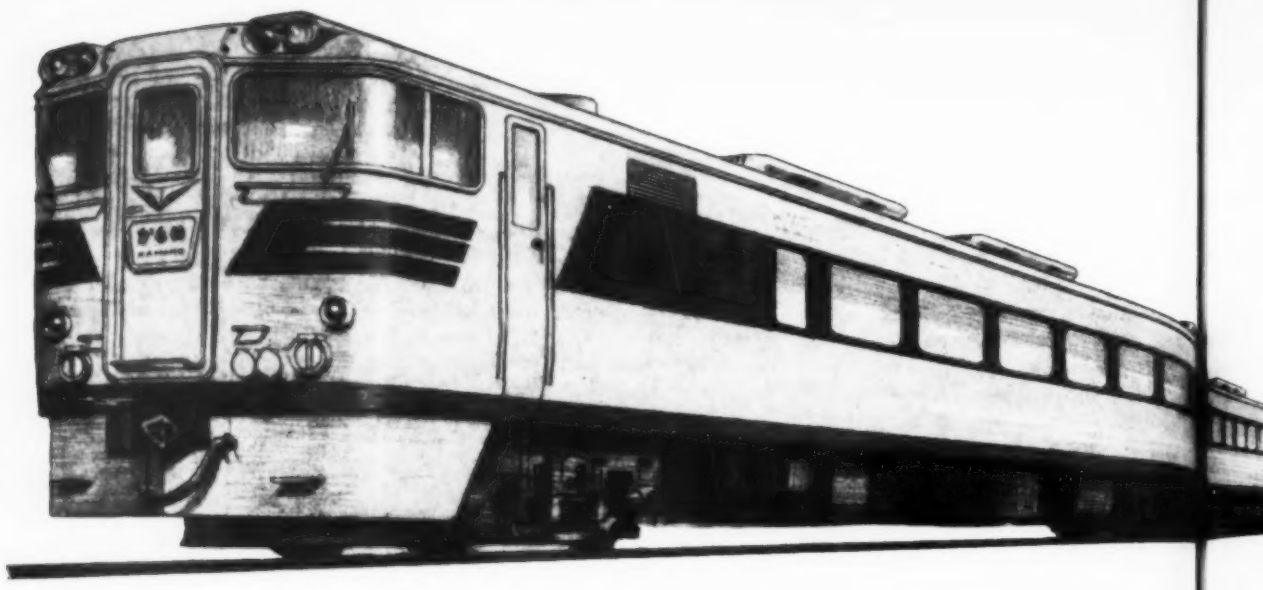
Four sandboxes, welded to the inner engine-room walls and filled through outside hatches, supply sanders discharging under the leading wheels of each truck. The sanders are interconnected with the wheel-slip-prevention equipment to provide automatic sanding as soon as slippage begins.

Cab controls are simple and generally convenient. A panel directly ahead of the driver contains the pressure gauges for braking and control, as well as warning lamps and electrical switches. To the driver's left is a Barco recording speed indicator (during the tests kilometer speeds were pencilled in outside the mph markings for the Austrian drivers) located directly ahead of the master controller. The brake column is on the right, and the master controller and reverse lever with tell-tale lights at the driver's left hand.

The master controller regulates both drive and braking. The drive side of the controller consists of 17 steps. At step 1 ("partial filling") the first stages of the converters are partially filled, permitting slow and carefully-controlled movements when operating light. At step 2 the starting converters are filled to normal level ready for operation, while the engine continues to idle at 600 rpm. Steps 3 through 17 provide graduated control of engine output up to full power. Transition between converter stages, as already mentioned, is fully automatic depending on controller position (engine speed) and track speed.

On the opposite side of the controller from the drive steps are eight steps for control of the hydrodynamic brakes. The layout of the controller calibration plate came in for some mild criticism from US motive-power men during the tests. The plate and pointer are so located as to be somewhat hard to read with the driver in a normal seated position. Some observers felt the provisions of actual notches in the controller would be of value: "If you want to make sure a new locomotive gets a fair chance to show itself, make the driver as comfortable as possible."

Actual control impulses for the drive, braking and reverse gear are transmitted by a pneumatic control system. The components are on a rack within the nose section. In addition to the direct controls, pneumatic safety circuits are provided, including overload protection which interlocks the engineer controls and air brakes to prevent engines being brought to full output while braking.



Japan Puts New Diesel Rail Cars In

In 1946 the Japanese National Railways operated 236 diesel rail cars. This figure jumped to 1,020 in 1956 and crossed the 1,500 mark in 1959. With a new Five Year Plan recently announced the national railways (JNR) will order new diesel rail cars by the hundreds. At present 127 such cars are on order for operation in limited express train services.

On 15 December 1960 the "Hatsukari" (Migratory Goose) made its debut on the Joban-Tohoku lines which radiate north out of Tokyo. Replacing a steam-powered limited express by the same name, the new diesel rail car train consists of nine cars equipped with a total of fourteen 180 H DMH-17H engines. Output per car is 280 hp or 6.5 hp per ton of train weight. This represented a major break through in the use of diesel rail cars operating in multiple unit limited express trains.

The 127 new units are slated for limited express trains which will be added to JNR schedules in October of this year. Chief among them will be the replacement of the steam-powered "Kamome" (Gull) between Kyoto and Hakata on Kyushu. This equipment will have a semi-streamlined appearance with partial wrap-around windshields and two sets of double headlights above the high-placed front windows.

The new diesel rail cars have one outstanding feature—they are of the multiple unit variety. This will permit flexibility in adjusting train lengths to traffic requirements, a major factor in a land which enjoys a yearly tourist and travel boom. Six cars, however, will be considered a basic consist. Average output per car is 300 hp while the output per ton of train weight is 6.5 hp, slightly higher than that of the "Hatsukari".

Among other features of these rail cars is the fact that the power-generating equipment is comparatively more extensive than that found in conventional type trains. Each car is equipped with a breaker which makes possible the switching on or off of the power-generating equipment without suspending operations. This eliminates the need for turning off coach lights each time cars are added to or taken from the train consist.

Generating equipment is installed underneath the car floor. A compartment containing a radiator, engine pre-heating unit, fuel tank and water tank is located at the rear of the driver's cab, on both sides of the central corridor.

The radiators on the "Hatsukari," it has been discovered, are not sufficient in capacity. Those on the new type diesel cars, therefore, have a greater capacity and are designed in such a way that whenever the temperature of the engine-cooling water becomes excessively high, the engine goes into idle operation. It will not be necessary to shut down the engine in such cases.

Known as the KIHA-82 (motorized, second class, 52 capacity), KIHA-80 (same but 72 capacity), KIRO-80 (motorized, first class, 48 capacity) and KISHI-80 (motorized, dining car) type cars these units have been fitted with disc brakes in order to effect efficiency in braking to the maximum degree.

On north-bound trains or consists operating in cold northerly climates special devices have been installed to protect various parts and machinery against low temperatures. The cars are also equipped with double-pane windows as insulation against the cold.

When these diesel cars and their respective trains are added to the time-table in October the JNR will have added substance to its words about striving for the use of locomotive-hauled trains for overnight limited express service

ar In Service

and rail cars for fast daylight limited schedules.

The Japanese National Railways has no intention of ceasing traffic expansion with the limited expresses. New diesel rail cars are on order to replace standard equipment on regular express trains. These may be classified by areas as follows:

- For Hokkaido: KIHA-56, KIHA-27 (second class motorized units) & KIRO-26 (first class motorized units).
- For Honshu: KIHA-58, KIHA-28 (second class motorized units) & KIRO-28 (first class motorized units).
- For the line having the "Abt" (rack rail) system: KIHA-57 (second class motorized units) & KIRO-27 (first class motorized units).

The above cars are being designed on similar lines to those of the "Hatsukari," but for regular express service. Those built for operation on Hokkaido (22 in all) were completed in March of this year and are now being operated extensively. The units slated for service on Honshu are rapidly being completed; 110 of these will be of the KIHA-58 type while 43, or possibly more, will be KIRO-28's. All are due to enter express

CONTINUED

Automotrices diesel pour le Japon

En 1946, les Chemins de fer de l'Etat japonais (JNR) possédaient 236 automotrices diesel. Dix ans plus tard, ce nombre avait été porté à 1020 et, en 1959, à plus de 1500. Actuellement, une commande de 127 véhicules du même genre est passée pour la traction de trains directs légers; le programme quinquennal des JNR prévoit encore un achat de cent automotrices. L'"International Railway Journal" présente, en collaboration avec les JNR, quelques innovations réalisées sur ces automotrices.

Chacune de ces automotrices diesel a, chose intéressante, la commande multiple. De ce fait, il est possible d'adapter la longueur des rames au trafic, ce qui est capital dans un pays où le nombre des voyageurs augmente d'année en année. Autre caractéristique: la puissance de ces véhicules moteurs, qui dépasse celle des automotrices classiques. En outre, le frein à vide a une distribution électro-magnétique supplémentaire par soupapes, qui supprime tout effet retardateur dans la transmission de l'effort de freinage. Pour préciser le confort de ces trains, nous dirons qu'il y a à la paroi frontale des voitures en indicateur de localités, qui précise aux voyageurs l'endroit où se trouve le train en marche.

Neue Dieseltriebwagen für Japan

Im Jahre 1946 besassen die Japanischen Staatseisenbahnen (JNR) 236 Dieseltriebwagen. Bis im Jahre 1956 hatte sich diese Anzahl bereits auf 1020 und in 1959 auf über 1500 erhöht. Gegenwärtig sind 127 neue Fahrzeuge dieser Art für die Führung von Leichtverkehrs-Schnellzügen bereits bestellt, wobei der Fünfjahresplan der JNR die zusätzliche Anschaffung von hunderten solcher Triebwagen vorsieht. Das International Railway Journal, dem die JNR zur Seite standen, berichtet über einige Neuerungen, die diese Triebwagen aufweisen.

Als wesentliches Merkmal besitzt jeder dieser Dieseltriebwagen eine Vielfachsteuerung. Dadurch lässt sich die Länge der Triebwagenzüge den Verkehrsbedürfnissen anpassen, was in einem Lande mit einer jährlich wiederkehrenden Hausse im Reiseverkehr einen wichtigen Faktor darstellt. Bemerkenswert ist auch die Krafterzeugungsanlage, deren Umfang das Mass der gleichen Einrichtungen herkömmlicher Triebwagen übertrifft. Ferner besitzt die Vakuumbremsausrüstung eine zusätzliche elektromagnetische Ventilsteuerung, die eine Verzögerung in der Bremskraftübertragung aufhebt. Als ein Beispiel des Komforts, der den Reisenden in diesen Zügen geboten wird, darf der "Ortsbestimmungsanzeiger" gelten. Es ist eine an der Stirnwand des Wagens angebrachte Einrichtung, die dem Reisenden den jeweiligen Ort angibt, wo sich der Zug während der Fahrt befindet.

Nuevos Autorieles Diesel para el Japón

En 1946 los Ferrocarriles Nacionales del Japón operaban 236 autorieles diesel. Esta cantidad alcanzaba los 1,020 en 1956 y excedía los 1,500 en 1959. Actualmente se están produciendo 127 nuevos autorieles para operación en servicios expreso limitados y se espera que bajo el nuevo plan quinquenal los JNR comprarán otros cientos más. La International Railway Journal, en cooperación con los JNR, presenta un informe actual sobre unas de las modificacones que se incorporarán en estos autorieles.

Tienen todos esta peculiaridad—cada coche es del tipo de unidad múltiple. Esto proporcionará la flexibilidad necesaria para adaptar la largura de los trenes a las exigencias del tráfico, factor importante en este país, donde hay cada año un punto culminante en el número de turistas y viajeros. Otra peculiaridad es que el equipo para la fuerza motriz es relativamente más extensivo que el del tipo convencional. Además del sistema del freno neumático, en que la fuerza del frenado se transmite por la reducción de la presión en la tubería del freno, se utiliza un mando de válvulas electro-magnéticas para eliminar la retardación en la transmisión de la fuerza del frenado. Para la comodidad de los pasajeros cada coche será provisto de un dispositivo que mostrará a los pasajeros la posición del tren durante el viaje.

JAPAN'S RAIL CARS

CONTINUED

train schedules. KIHA-57 and KIRO-27 are similar to the KIHA-58 and KIRO-28 with but one notable exception: Disc brakes are used instead of the conventional type.

The KIRO-type cars (first class) are equipped with plush reclining seats. Car width is 2,900 mm (on 1,067 mm gauge!) and other features include forty watt fluorescent lamps for ample illumination and 5W lamps for use during sleeping time. All diesel rail units have hydraulic torque-converters and those for use in cold northerly climates are equipped with special coverings which protect equipment from the elements. These cars also have a plow pilot. Remaining units can also be converted to this status by the simple addition of defrosters, snow-plows and the like.

Other than those specified above, the regular diesel rail cars will have electro-pneumatic control equipment (DC 24V) so that the cars can be centrally multiple controlled. Conventional DA system air brakes will be used. The cars mentioned previously as having DAR and disc brakes are those slated for service on the steep grades of the present "Abt" (rack railway) line.

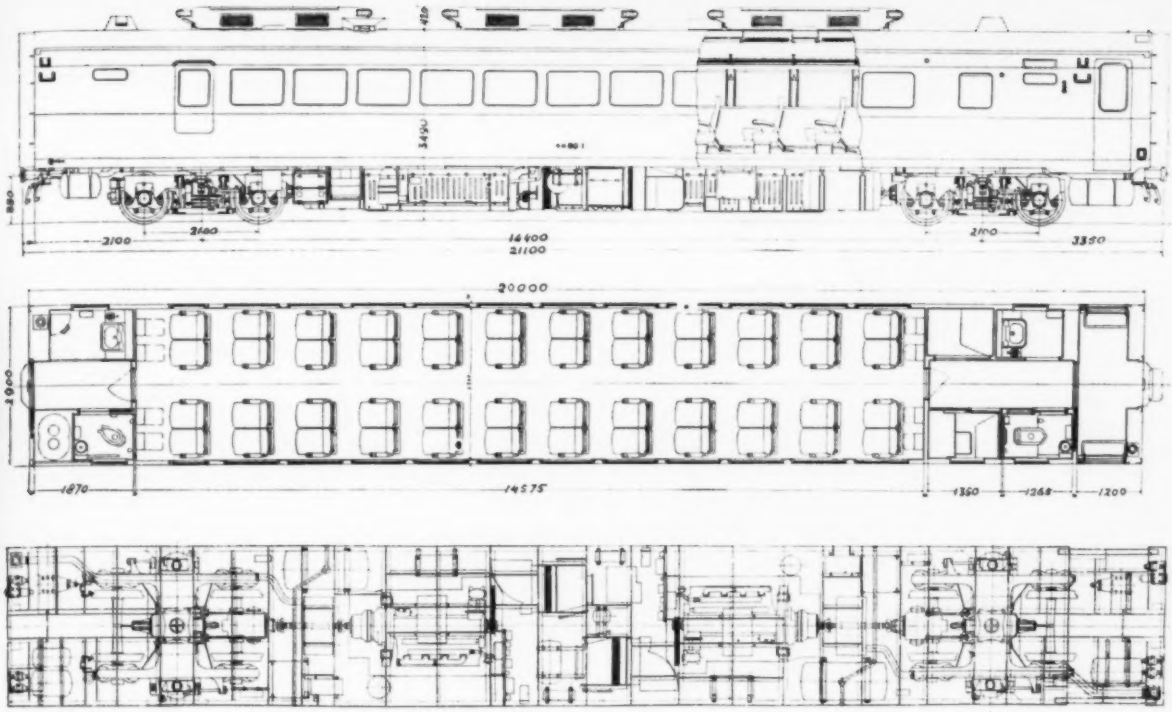
Since the gear ratio of the converter is the same as for regular type cars, i.e. 2,976, these diesel rail units are capable of attaining the same 95 km/h maximum speed. Bogies (trucks) to be used are those of the DT 22A type for motored cars, TR 51A for trailer units and DT 31 and TR 68 for cars due to operate over the "Abt" (rack) line in mountainous Central Honshu. It has already been proven to the satisfaction of all involved that these bogies (trucks) are the best available in respect to working efficiency. This was a highly important factor in the light of the sharp curves and steep grades to be found in the areas where these cars will operate. From the standpoint of economy it was decided not to install air springs (pneumatic suspension system) on these rail cars.

While the new diesel rail cars lend themselves to some modification to fit a particular type of service, or to some degree of streamlining as in the case of the new "Kamome" (Gull), they are found to be most desirable from the standpoint of interchangeability and uniformity of design. Mass production methods have always lent themselves to economy and the JNR is embracing this truth in no uncertain terms.

Since the new diesel rail cars detailed above will include units for the "Abt" system line it may be well to offer a few words of explanation here about that rack railway section.

KIHA-57 (above) is similar to KIHA-58 with one notable exception: disc brakes are used instead of the conventional type. It will work on the Shin-etsu line rack railway and has been equipped for service in Japan's cold regions. The interior (below) has been designed for maximum comfort under varying conditions.

The Shin-etsu line is an important route connecting the outer coast of the main Japanese island with the inner coast, in particular Tokyo and the coast facing the Japan Sea. Because of its importance as a trunk line, construction work began in the early years of Japan's railway history. However, the route between Yokokawa and Karuizawa (11.2 km) was a steep mountain climb over the 554 meter high Usui Pass, and, in the years before 1890, transportation over this section was confined to horse-drawn vehicles. However, in 1891 construction of the existing track with its 66.7 ‰ gradient was started. In 1893 the Abt-system rack rail with Abt-system steam locomotives entered service, thus permitting the opening of the entire Shin-etsu line. In 1912 this system was electrified with a 600 volt DC third rail installation. Four electric locomotives could pull a 280 ton train as of 1930. At the present time 360 ton trains are being hauled over the line 24 times per day. However, with increasing demands upon



The "Hatsukari" (Migratory Goose) has several features adopted to the new diesel cars slated for operation in limited express train services. It consists of nine cars equipped with a total of fourteen 180 H DMH-17H engines. Output per car is 280 hp or 6.5 hp per ton of train weight. In addition to the air brake system in which the brake force is transmitted by reduction of pressure in the brake pipe, an electro-magnetic valve control is jointly used so as to eliminate the entire lag in transmission of brake force.

the now-aging one-track "Abt" facilities the JNR has decided to double track the line. Should the second track contain a rack rail? This was the great question that had to be answered. After many tests it was found that adhesion operation was indeed possible with locomotives built for such grades and incorporating superior braking facilities. Liberal doses of sand were found to be effective for a train climbing up the 66.7 $^{0}/_{00}$ grades, even under the worst conditions—oil on the tracks!

Enter now the diesel rail cars of the KIHA and KIRO variety as outlined previously. It is felt that these operating in multiple unit will be able, by even distribution of driving force, to scale the sharp grades of the present "Abt" system. Greater pulling power and the finest disc brakes are determining factors.

With diesel rail cars in limited express service, operating in multiple units in cold climates and scaling the heights of Japan's steepest grades it is safe to say that the rail car has come of age and will play an increasingly important roll in Japan's over-all railway picture. The Land of the Rising Sun is one of the world's greatest users of diesel and electric rail cars.

Diesel Rail Car Specifications

Car Type:	KIHA–82 (2nd cl.)	KIHA–80 (2nd cl.)	KIRO–80 (1st cl.)	KISHI–80 (Dining)
Capacity (Persons)	52	72	48	32
Tare (tons)	42	40	41	41
Length (m)	21.3	21.1	21.1	21.1
Width (m)	2.903	2.903	2.903	2.903
Height (m)	3.91	3.91	3.91	3.91
Engine Model	DMH 17 H	DMH 17 H	DMH 17 H	DMH 17 H
No. and hp	1 × 180 hp	2 × 180	2 × 180	2 × 180
No. of power generating sets	1	—	—	—
Generator model	DMH 17 H-G	—	—	—
Power	160 hp	—	—	—
Generator model	DM 63	—	—	—
Rated capacity	125 KVA	—	—	—
Unit cooler	4	6	6	6
Water heater	1	1	1	2 (Larger size)
Water cooler	1	1	1	1 („ „)

Total output: 1,800 hp
Maximum speed: 100 km/h
Gear ratio: 1 : 2613

Switzerland TE

The new TEE trainsets are fitted with complicated traction plants, necessary for operation over four different electrical systems. Nevertheless, driving controls are quite simple.

New electric Trans-Europ-Express trains introduced by the Swiss Federal, Italian State and French National Railways this summer provide passengers with as modern and comfortable accommodations as are to be found on rails anywhere in the world. Equally as important, the four new trainsets, which are being put into service on the Zürich-Gotthard-Milan and the Milan-Simplon-Paris routes, will fill an important gap which has hitherto existed in the TEE network between northern and southern Europe.

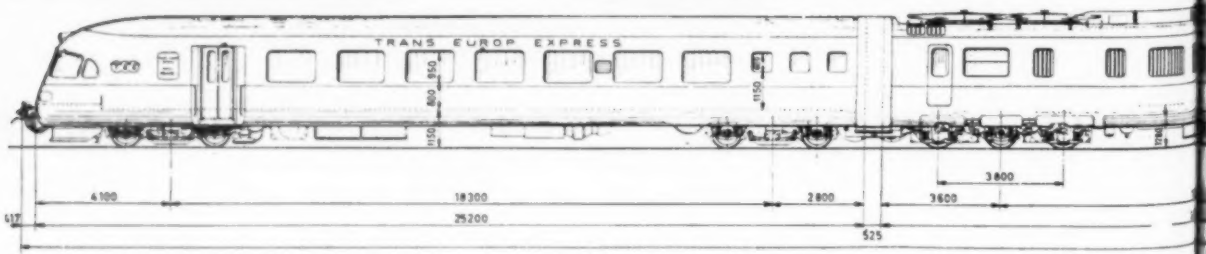
Each of the new TEE trainsets is composed of five units:

- Coaches with control compartments at each end of the train.
- Traction unit fitted with appropriate equipment for operation over four different electrical systems—two AC and two DC—and also containing kitchen and staff rooms.
- Restaurant-car with bar room.
- Intermediate coach.

The three coaches provide seating accommodations for 126 passengers, and are fitted out similarly to the diesel-electric TEE trains built by the Swiss Federal in cooperation with the Netherlands' Railways. The trains have an overall length of 125 m and a weight of approximately 250 metric tons. Total output of the traction motors is 3,400 hp, enabling the trains to travel at 85 km/h (about 53 mph) on the steepest gradients (up to 1 in 40) of the Gotthard and Simplon lines, and to attain speeds of 160 km/h (about 99 mph) on level stretches.

Coaches are of center-corridor design with cloak and luggage rooms situated near the entrance doors at one end of the car and toilettes and powder room at the other. Coaches are lighted by a large luminous band fitted into and running along the center of the ceiling, and air-conditioned with equipment supplied by Brown, Boveri & Co., Ltd.

The decision to adopt electric traction has resulted in an additional advantage for passengers: more space in the dining



TEE trains set new records

car. Since the equipment for the four-current electric traction system does not require as much space as the diesel plant in other TEE trains, designers were able to locate the kitchen and pantry in the neighboring traction unit. Thus, the usual seating arrangement of two chairs side by side, four in a row—which has proved too crowded—has been reduced to two chairs on one side of the aisle and one on the other for a total of forty-eight seats. Six seats are available in the bar section where drinks and snacks are served.

The traction unit, which weighs 96.5 metric tons, runs on two six-wheel bogies with a total of four axles powered by DC traction motors. Four pantographs are mounted on the roof of the car to enable the train to operate over the four different electrical systems as follows:

15 kv AC $16^{2}/_{3}$ cycles (Switzerland)
3,000 volts DC (Italy)
1,500 volts DC (France: Dole-Paris)
25 kv AC 50 cycles (France: Vallorbe-Dole)

With this equipment the trains could also operate over the electrified lines of the Austrian, German, Belgium and Netherlands networks. They would also be able to work the "Edelweiss" TEE service between Zürich and Amsterdam should this be necessary.

When operated with single-phase energy, the electric current is transformed by silicon rectifiers into pulsating direct current, the so-called "wave current." The traction motors can be driven with this, or with ordinary direct current. They are built for a working tension of 1,500 volt. Traveling over the Italian lines, on 3,000 volt direct current, each pair of the four traction motors is continually connected in series.

The traction unit also contains the electric equipment to supply the required energy for the kitchen, the air-conditioning plant, the electric heating system, the lighting system, and the signal and safety circuits, in the form of three-phase current of 380 volts at interlinked tension. This current is produced by the generator of a convertor set driven by two 1,500 volt direct-current motors, connected in the same way as the traction motors.

Although the four-current electrical system has resulted in a complicated traction plant, driving controls are quite simple. The driver need only press the key related to the desired current system and all the required switching is effected automatically in the proper sequence. The regulation of speed is the same for all the four current systems. In fact, the equipment of the driver's compartment differs very little from that of other modern locomotives.

Drivers are changed on the way so that the train may be handled by men who are familiar with the lines concerned in each country. During the initial period, a Swiss board mechanic is to accompany the trains to deal with minor disturbance if need be.

On one and the same day, the four new TEE trains are being used alternatively, as follows:

Train 1 Zürich-Milan-Paris
Train 2 Paris-Milan
Train 3 Milan-Zürich-Milan-Zürich
Train 4 Kept in reserve at Zürich HB

Aside from their ability to operate with four different types of current, the new TEE trains are setting a number of other records. One, for a TEE train, is the scheduled average speed of 132 km/h (about 90 mph) over the 314-km route from Paris to Dijon.

Another record, lies in the fact that one of the trains each day makes one south-bound and two northbound runs between Milan and Zürich, with a turn-around time of no more than 20 minutes at Zürich and 25 minutes at Milan. This itinerary of 885 km entails three ascents to the 1149-m Gotthard tunnel, and a total climb of some 3544 m during the day.

The trains were constructed by the Swiss Industrial Company in Neuhausen (SIG) and the Machine Manufacturing Co. in Oerlikon.

Nouveaux TEE électriques

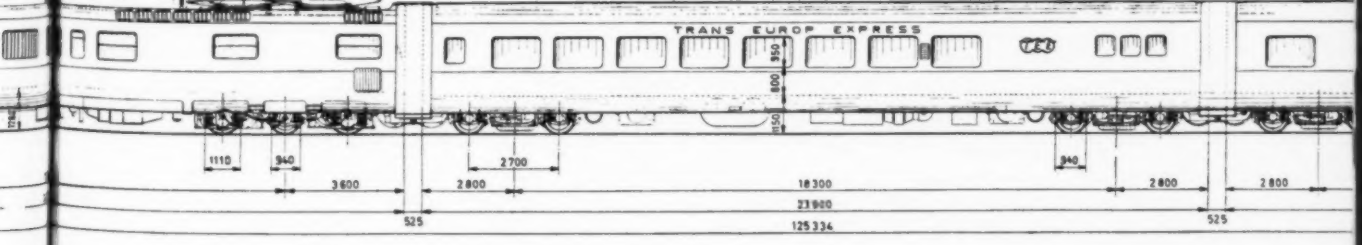
Les Trans-Europ-Express lancés cet été par les Chemins de fer fédéraux suisses, les Chemins de fer italiens de l'Etat et la Société nationale des chemins de fer français offrent ce qu'il y a de mieux au monde en fait de confort et de commodités. Ce qui est important aussi, c'est que les quatre nouvelles rames achetées par les Chemins de fer fédéraux suisses (voir IRJ de mars 1961) comblent une lacune sensible entre les deux anciens réseaux TEE du sud et du nord de l'Europe. Ces trains circulent sur les lignes Zürich–Saint-Gothard–Milan et Milan–Simplon–Paris.

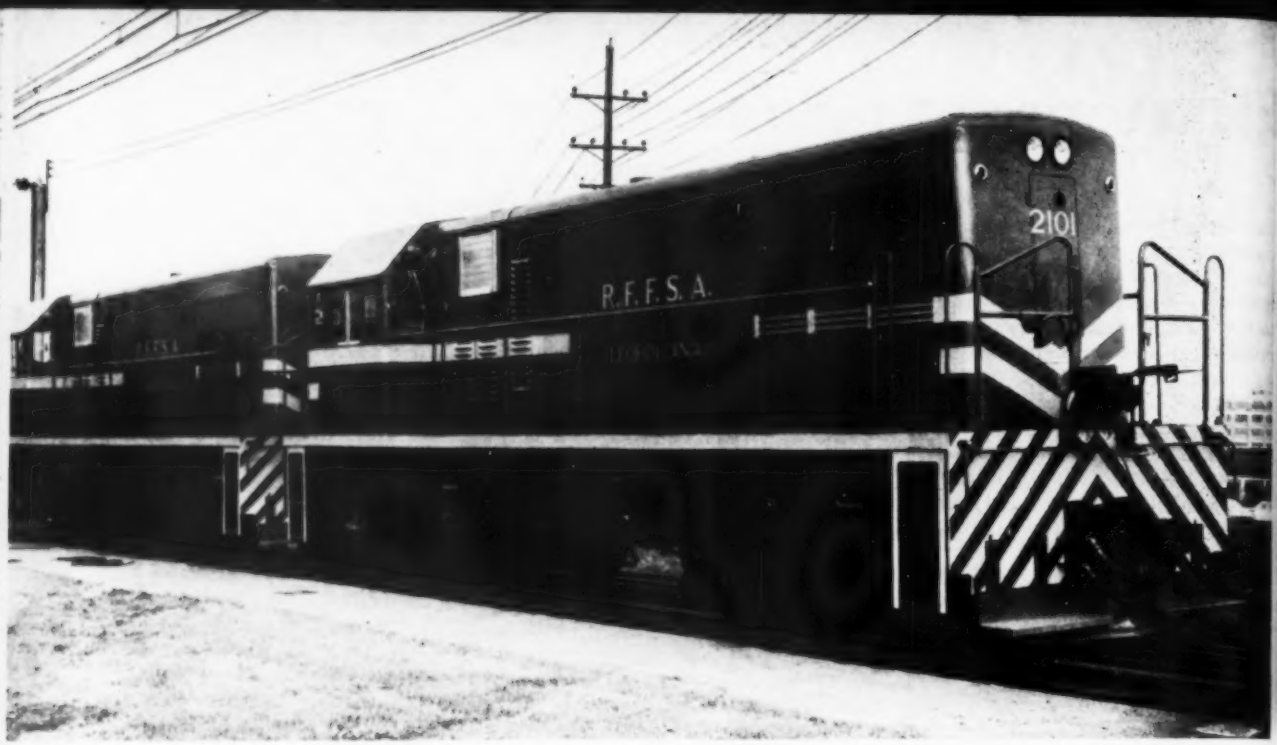
Neue elektrische TEE-Züge

Die diesen Sommer von den Schweizerischen Bundesbahnen, den Italienischen Staatsbahnen und der Nationalgesellschaft der Französischen Eisenbahnen eingeführten TEE-Züge bieten eine Reisegelegenheit, die an Komfort und Bequemlichkeit das Beste darstellt, das man irgendwo finden könnte. Wichtig ist auch, dass die vier neuen, von den Schweizerischen Bundesbahnen angeschafften Zugeinheiten (siehe IRJ, März 1961) eine empfindliche, bisher zwischen Nord- und Südeuropa bestehende Lücke im TEE-Netz ausfüllen. Diese Züge versehen den TEE-Dienst auf den Strecken Zürich–Gotthard–Mailand und Mailand–Simplon–Paris.

Nuevos trenes eléctricos TEE

Este verano los nuevos trenes del servicio Trans-Europ-Express introducidos por los FFCC Federales Suizos, los FFCC del Estado Italianos y los FFCC Nacionales Franceses ofrecen a los pasajeros acomodaciones tan modernas y confortables como por dondequiera. De igual importancia es el hecho de que las cuatro nuevas ramas que los FFCC Suizos han pedido, permitirán al sistema llenar la laguna en el servicio TEE entre Europa del Norte y del Sur. Se ha puesto los trenes en servicio en el trayecto Zurich–Gotthard–Milán y en el de Milán–Simplon–Paris.





First of the sixty-five U8B units for Brazil are given final check on meter-gauge test track at manufacturer's plant prior to shipment

Brazilian Railways Place Orders for 18

As part of a major locomotive program now under way in Brazil, contracts have been recently awarded to one manufacturer for the purchase of 173 new diesel-electric units and seven electric locomotives—a total of 180 new units for service on the Federal Railway System.

This contract was obtained by the International Division of General Electric Co., and all units are being built by the GE firm. Cost of the entire program is $23,500,000 (US). The diesel-electric locomotives are already in production.

The purchase program was handled by a centralized procurement office for the Federal Railways (Rêde Ferroviaria Federale S.A.). As deliveries are made, the new locomotives will be assigned to each of eight railways which are part of the Federal System.

Of the 173 diesel-electrics, 65 are "U8B" locomotives and 108 are "U5B". These identifying symbols are model designations assigned by the manufacturer.

The two models are essentially of one basic design, with 90% of the engine wearing parts interchangeable. Such interchangeability minimizes the railway's investment in renewal and repair parts.

The U8B will deliver 810 hp (818 metric hp) for traction and is arranged for multiple-unit operation; the U5B will deliver 540 hp (545 metric hp) for traction and is built for single-unit service. The U5B design is such, however, that later conversion to multiple-unit will be possible. There are a total of 153 meter-gauge U8B and U5B units, and 20 1600.2-mm (63-in.) gauge U5B's in the Brazilian order.

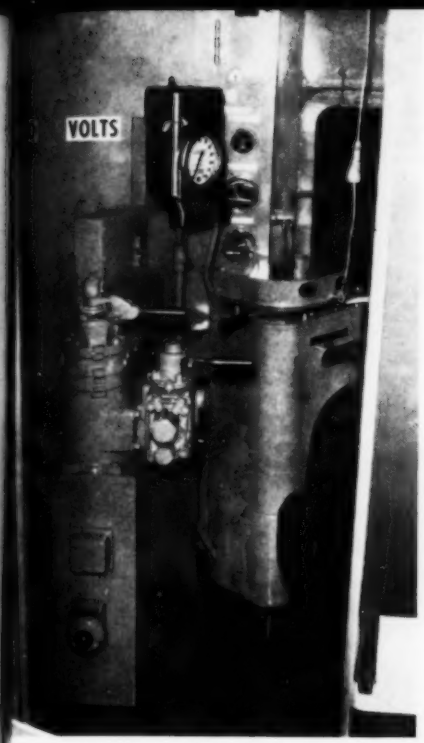
The Caterpillar diesel engines in the two locomotive models differ mainly in number of cylinders—the U8B having 12 cylinders, the U5B having eight. Both have a 159 mm bore and 203 mm stroke. The U8B is provided with dynamic braking.

Underframes of the two locomotives are the same except for the mounting of the engine base and supports for some of the auxiliary power plant equipment. Engine hoods are the same but for locations of certain equipment. Operators' cabs are identical. All of the locomotives can later be ballasted for greater weight by utilizing underframe openings provided for the purpose.

The control compartments are also the same in both models, with contactors and most of the other control devices of common design. The U8B has field shunting and speed controlled transition for utilization of the greater engine horsepower. Traction generators are the same, with the difference in horsepower input compensated for by a small electrical change in the exciter. This reduces excitation of the main generator and prevents overloading of the engine. The standardized GE-761 traction motor is used on all of these locomotives, both meter and 63-in. gauge.

The 6-SL air brake schedule has been chosen for all of these locomotives. The major air brake devices are standardized for all types of operation. By adding operating portions to existing valves and additional valves as needed, a number of control features could be obtained if needed at a later date: safety (deadman) control, overspeed control, and automatic train stop. Most of the air brake devices not requiring attention of the operator are located on an air brake equipment rack in the engine hood. The location of equipment has been standardized to simplify servicing. Space and supports are provided for adding equipment described above. A two-cylinder air-cooled compressor is used—same model on both types of locomotives.

Two types of bogies are being furnished. Type URS (rubber sprung) bogies provide lateral motion for high speed



Operator's cab is identical in both units

18 Locomotives

services; and the rigid-bolster bogies which do not have lateral motion and are suitable for lower speeds. Both types of bogies are interchangeable, as sets on either locomotive. Thus one of the U8B units could be put on rigid bogies for emergency use or one of the U5B locomotives could be speeded up by application of URS bogies. However, in the present order, U8B units will be equipped with the URS bogies; the U5B units with the rigid-bolster type.

Solid, multiple wear, rolled steel, 914 mm (36-in.) wheels are used on all of these diesel-electric locomotives. Axles on all of the meter-gauge locomotives are interchangeable. Couplers and draft gear are the same on all 173 locomotives, but coupler height is 749.3 mm on the meter-gauge locomotives and 1,066.8 mm on the 63-in. gauge.

The new diesel-electric locomotives will operate on the following railroads in Brazil:

E. F. Leopoldina is receiving 43 of the U8B locomotives for use on its 3,057.67 km of meter-gauge lines. These include the first of the model U8B's to be placed in service.

V.F.F. Leste Brazileiro (Eastern Brazil)

CONTINUED

Le Brésil commande 180 locomotives

Le Brésil, qui exécute en ce moment un grand programme de renouvellement de son parc de véhicules moteurs, a récemment passé commande de 173 locomotives diesel-électriques et de sept locomotives électriques, ce qui donne un total de 180. La réalisation du programme, exécuté par la "General Electric Company", représente une dépense totale de 23.500.000 dollars. Les locomotives diesel-électriques sont en cours de construction. Pour les machines électriques, on établit les projets; la construction ne commencera que dans quelques mois.

Les 173 locomotives diesel-électriques sont de deux types, mais de construction assez voisine pour l'essentiel. Les pièces soumises à usure peuvent être changées à raison de 90%, ce qui contribuera à diminuer les frais de revision et de réparation. Le type U8B a une force de traction nominale de 818 CV; il est équipé avec la commande multiple. Le type U5B a une force de traction nominale de 545 CV; il n'a que la commande ordinaire, mais peut être pourvu ultérieurement de la commande multiple. Les moteurs diesel des deux types de locomotives se distinguent surtout par le nombre de leurs cylindres, qui est de douze pour l'U8B et de huit pour l'U5B.

Brasilien bestellt 180 Lokomotiven

Brasilien, das gegenwärtig ein grosses Programm der Lokomotiverneuerung durchführt, schloss vor kurzem Verträge für die Lieferung von 173 dieselelektrischen Einheiten ab. Dazu wurden 7 elektrische Lokomotiven bestellt, womit das Total der in Auftrag gegebenen Triebfahrzeuge 180 beträgt. Die Gesamtaufwendungen für die im Programm vorgesehenen Einheiten, die alle von der General Electric Company gebaut werden, belaufen sich auf US-$23.500.000. Die dieselelektrischen Lokomotiven befinden sich im Bau. Begonnen wurde auch mit der Projektierung der elektrischen Einheiten, deren eigentliche Konstruktion aber erst in einigen Monaten aufgenommen wird.

Die 173 dieselelektrischen Lokomotiven bestehen aus zwei Typen, die jedoch im wesentlichen auf der gleichen Bauart beruhen. Die der Abnutzung ausgesetzten Bestandteile der Maschinen sind zu 90% auswechselbar, was die Aufwendungen für Revisionen und Reparaturen vermindert. Der Typ U8B hat eine Traktions-Nennleistung von 818 PS und ist mit der Vielfachsteuerung versehen. Typ U5B verfügt über eine Traktions-Nennleistung von 545 PS, besitzt nur die normale Steuerungseinrichtung, kann aber später auf die Vielfachsteuerung umgebaut werden. Die Raupendieselmotoren der beiden Lokomotiven unterscheiden sich hauptsächlich in der Anzahl der vorhandenen Zylinder, wovon Typ U8B 12 und Typ U5B 8 aufweist.

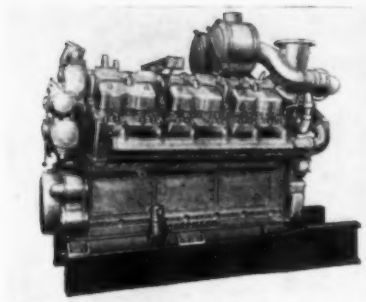
El Brasil compra 180 locomotoras

Se está ejecutando un importante programa de locomotoras en el Brasil, donde se acaban de celebrar los contratos para la compra de 173 unidades diesel-eléctricas. Además se ha colocado un pedido de siete locomotoras eléctricas y así en total 180 unidades serán adquiridas. Todas las unidades serán construídas por la General Electric Co. y el programa entero costará US$23.500.000. Ya se ha comenzado la producción de las locomotoras diesel-eléctricas; se están ejecutando los trabajos de diseño de las unidades eléctricas, pero la fabricación de éstas no comenzará hasta en varios meses.

Las 173 diesel-eléctricas serán construídas según dos modelos, los dos de un diseño básico, siendo 90% de las piezas de desgaste intercambiables, lo que reduce al grado mínimo la inversión del ferrocarril en piezas de repuesto. La U8B suministrará 810 CV (818 CV métricos) para tracción y está equipada para la marcha en unidades múltiples; la U5B suministrará 540 CV (545 CV métricos) para tracción y ha sido construída para el servicio de unidad sencilla. Sin embargo, el diseño permite la conversión en una unidad múltiple. Las máquinas diesel Caterpillar difieren principalmente en el número de cilindros, teniendo la U8B 12 cilindros y la U5B ocho.

Comparative Specifications

	U8B	U5B
Ratings:		
Diesel engine gross horsepower	910 cv	607 cv
Continuous horsepower to generator for traction	818 cv	545 cv
Tractive effort at 30% adhesion	16,329 kg	14,969 kg
Continuous tractive effort	15,422 kg	15,422 kg
Maximum Locomotive speed	97 km/hr	64 km/hr
Weight:		
Basic locomotive (fully loaded)	54,429 kg	49,896 kg
Per driving axle (fully loaded)	13,607 kg	12,473 kg
Wheel Arrangement	B-B	B-B
Dimensions:		
Length over end frames	10,209 mm	10,209 mm
Height (overall)	3,733 mm	3,733 mm
Width (overall)	2,743 mm	2,743 mm
Wheel diameter	914 mm	914 mm
Gear ratio	94 : 17	94 : 17
Clearance (motor case to rail)	108 mm	108 mm
Minimum radius of curvature—locomotive alone	22.9 m	22.9 m
Capacities:		
Fuel	1,514 liters	1,514 liters
Lubricating oil	321 liters	235 liters
Engine water	454 liters	416 liters
Sand	566 liters	566 liters
Engine data:		
Caterpillar model	D398	D379
Cylinders—arrangement and number	V-12	V-8
Bore and Stroke	159mm x 203mm	159mm x 203mm
Full load speed	1,300 rpm	1,300 rpm



U8B locomotive is powered by a Caterpillar V-12 diesel engine

Rubber-sprung bogies will form standard equipment on U8B loco

Traction motors are a GE model 761. Above view from pinion end

BRAZILIAN LOCOMOTIVE ORDERS CONTINUED

is also getting meter-gauge U8B locomotives, 22 in number.

R.V. Parana-Santa Catarina will receive the first of the U5B locomotives, 26 in number. They will operate on 2,695 km of meter-gauge routes.

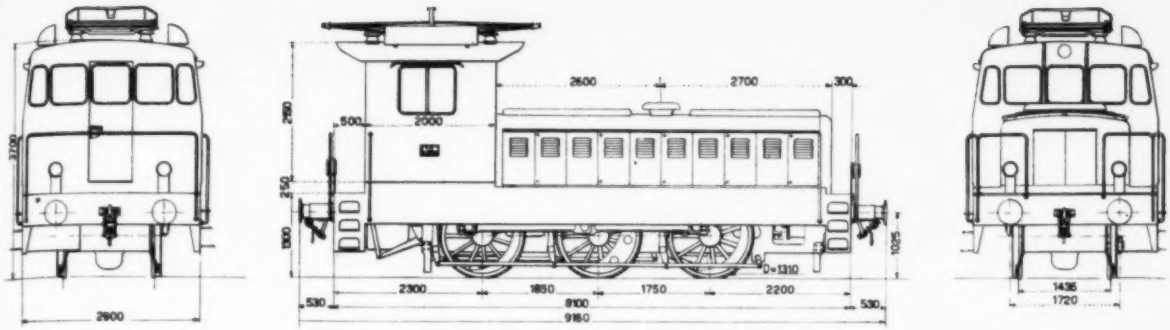
Rede Mineira de Viacao will operate 20 U5B locomotives on 4,023 km of meter-gauge line and E. F. Goias eight on its 478-km line. These two railroads comprise a very important link in the freight route between Rio de Janeiro and Anapolis. The latter is at present the nearest station to Brasilia, the new capital. E.F. Noroeste do Brazil is getting 29 U5B locomotives for its 1,764 km of meter-gauge lines.

E. F. Braganca, operating in the State of Para, has been designated to receive U8B locomotives for use on its 260 km meter-gauge lines.

The only broad gauge U5B locomotives, 20 in number, will be used on E.F. Central do Brazil, which has 1,486 km of 63-in. gauge railroad.

The U8B locomotives with URS bogies, MU control and dynamic braking are the more versatile and are in fact completely universal in application. It is anticipated that, in freight service, up to four units will be used in multiple on long trains and heavy grades. Single units can handle local or branch line freight and do switching. In passenger service, single units can pull suburban trains. Multiple units can haul longer trains. The U5B locomotives, originally equipped for single unit operation, will find most of their applications on branch line freight service and switching yards or on industry spurs. They can handle passenger trains on branches where local conditions limit the speed to not over 65 km/h.

It is presently anticipated that the U5B locomotives will have multiple unit control added at a later date. This will enable a long freight train to leave an initial terminal with three or four units in multiple. At a junction point along the line, a single unit can take a part of the train on a branch line.



Italy Converts Shunters

Steam locomotives converted into something else are not particularly uncommon; only recently a major locomotive manufacturer, English Electric, unveiled a direct-drive gas turbine unit based on the running gear of a British Railways 4-6-0. Diesel locomotives with a steam ancestry can be found in such widely-separated places as Western Australia, the cypress swamps of southern United States, North Wales and on any number of French narrow-gauge lines. And a typical four-wheeled tram locomotive was electrified in Holland as long ago as 1926.

What distinguishes the E-321 electric shunter of the Italian State Railways (FS) from the others is not so much its use of running gear from a steam locomotive (IRJ, May "World Report" and June, p. 24) as the fact that the conversion program is a large-scale project, involving (to start) 60 units. Previous conversions have been largely home-made affairs, often one-of-a-kind mavericks whose design was determined chiefly by the materials at hand in a none-too-prosperous shortline backshop.

Economy is, in fact, an important factor in the development of the E-321. Italy's national railway system is today caught between the two horns of a dilemma. On the one hand is ambitious modernization with electrification as a central element; on the other is a deficit of imposing proportions.

Though shunting, to date, has been performed almost exclusively by steam tank engines and a few diesels, even in electrified territory, electric shunting power has undeniable attractions in fuel-short Italy. In particular, the installation of electric overhead on virtually all trackage, classification yards included, in electrified territory is an added incentive.

Integral to the development of the new locomotive, of course, was the existence of a large number of locomotives belonging to the series 835—the well-proven and ubiquitous "Italian Tank," beloved by model-railway enthusiasts and affectionately known as "La Caffettiera" ("Coffeepot") by Italian railwaymen and knowledgeable passengers.

Aside from its coal-burning ancestry, the new shunter is notable in a number of respects. One minor innovation is the provision of a complete electric train-heating circuit that permits the use of the locomotive, if desired, to heat winter passenger trains while they await the coupling of the mainline electric unit.

Even more significant is the design of the electrical circuitry and equipment, furnished by Technomasio Italiano Brown Boveri of Milano. The prime-mover unit consists of a primary 3000-volt motor driving a generator, which in turn furnishes current to a single induction traction motor with a continuous rating of 190 kw. Motor speed and direction of operation are obtained by a manual controller which alters the independent excitation of the generator. The traction motor drives the center axle of the locomotive through the medium of a gearbox with a coupling, conical and spur gears, working in a pump-circulated oil bath. Total reduction of the transmission is 1:12.4.

Altogether a total of 50 shunters of the E-321 series are projected, together with 10 booster units, identical with the exception of cab and pantograph which will be omitted in the boosters. Use of the two units in a "cow and calf" combination is expected to meet the heaviest demand that is apt to be placed on shunting power on the FS.

A major consideration in the design of the E-321 was the development of a conversion method which would not be limited only to electric shunting power. The E-321, for example, is so designed that a diesel unit could be created with only the substitution of a diesel engine for the 3000-volt primary motor, all other elements remaining the same.

Locomotive de manoeuvre

Il n'est pas rare de voir des locomotives à vapeur transformées en d'autres machines. Ce qui distingue la locomotive de manoeuvre électrique E-321 des Chemins de fer italiens de L'Etat (FS), ce n'est pas non plus son train de roues prélevé sur une ancienne machine à vapeur (IRJ mai "World Report" et juin, p. 24). C'est le fait qu'il ne s'agit pas là d'un exemplaire unique, oeuvre d'un atelier secondaire utilisant des moyens de fortune, mais l'exemple d'une transformation entreprise sur une vaste échelle.

Bemerkenswerte Rangierlok

Der Umbau von Dampflokomotiven in andere Maschinen ist nichts besonders Aussergewöhnliches. Sehr auffallend ist es auch nicht, dass die elektrische Rangierlokomotive E-321 der Italienischen Staatsbahnen (FS) das Laufwerk einer ehemaligen Dampflokomotive besitzt (IRJ "World Report" Mai, und Juni, Seite 24). Bemerkenswert ist dagegen, dass es sich im vorliegenden Fall nicht um die Einzelarbeit einer etwas unterbeschäftigten und sparsam ausgerüsteten Nebenwerkstätte, sondern um den Teil eines weitreichenden Umbauprogramms dieser Art handelt.

Locomotora de maniobras

No es rara la conversión de locomotoras de vapor en otra cosa, pero lo que distingue la E-321 de los Ferrocarriles de Estado Italianos (FS) no es tanto el uso del rodaje de una locomotora de vapor (IRJ mayo "World Report" y junio pág. 24), mas bien el hecho de que el programa de conversión es un proyecto en gran escala. Conversiones anteriores han sido mayormente cosas "hechas en casa", cuyo diseño dependía de los materiales disponibles en el pequeño taller de un ferrocarril secundario no próspero del todo.

OPERATING RESULTS 1958/1959

RAILWAY:	LENGTH OF TRACK		EMPLOYEES		PASSENGERS		FREIGHT	TON
	Kilometers	% of total	Number	% of total	Passenger Kilometers (thousands)	% of total	Ton-Kilometers (thousands)	Ton-Kilo (thous
BELGRANO (1)	15,611	35.5	77,223	35.2	3,105,287	18.8	4,765,004	13,28
URQUIZA (2)	3,560	8.1	15,599	7.1	849,883	5.2	909,489	2,65
ROCA (3)	8,772	20.0	42,176	19.2	4,418,935	26.8	4,051,667	13,61
MITRE (3)	6,696	15.3	39,029	17.8	3,507,026	21.3	2,376,695	10,57
SAN MARTIN (3)	4,659	10.6	27,975	12.7	1,958,766	11.9	2,650,634	8,85
SARMIENTO (3)	3,867	8.8	16,698	7.6	2,627,053	15.9	1,036,581	5,03
PATAGONICO (4)	780	1.7	838	0.4	18,323	0.1	13,323	5
TOTAL	43,945	100.	219,538	100.	16,485,273	100.	15,803,393	54,07

*The Argentine peso's July free market price was approximately .0122 US dollar.

Argentina: What Has Caused the

Argentine: Quelles furent les causes de la crise?

Le programme de rénovation et de modernisation des Chemins de fer de l'Etat argentin, qui porte presque sur tout le réseau ferré, a été présenté et discuté dans le numéro de juillet du IRJ. Ce rapport d'un correspondant particulier précise les causes de la crise actuelle, explique comment elle est née et comment elle pourrait être surmontée.

Argentinien: Was verursachte die Krise?

Das Rehabilitierungs- und Modernisierungsprogramm der Argentinischen Staatsbahnen, das sich fast auf das ganze Eisenbahnnetz erstreckt, ist in der Julinummer des IRJ behandelt worden. Dieser Bericht eines Sonderkorrespondenten orientiert über die Ursachen der gegenwärtigen Krise, erklärt wie diese entstanden ist und überwunden werden könnte.

Argentina: Causas de la Crisis

En el número de julio la IRJ informó sobre el programa de rehabilitación y modernización de los Ferrocarriles del Estado argentinos. Este reportaje de nuestro corresponsal especial informa sobre las causas de la crisis actual, porqué se ha producido ésta y cómo se pueda afrontarla.

The Argentine State Railways are beginning the difficult task of rehabilitating and modernizing almost the entire network. Abnormally high deficits have led to plans for a thorough reorganization, including large reductions in the work force and curtailment of marginal services. Much new equipment will be required.

This new program was outlined by Dr. Roberto T. Alemann, Minister of Economy of Argentina, in the International Railway Journal for July, page 25.

The following report, prepared for IRJ by a special correspondent in Buenos Aires, outlines the problems which have put the Argentine rail system in its present condition. The reasons include gauge variations, a shortage of motive power, insufficient rolling stock, poorly-maintained trackage, high wage costs and lack of trained supervisory personnel and skilled labor.

The Argentine railways are in a state of grave crisis—suffering ruinous losses from

GROSS TON-KILOMETERS		REVENUE		EXPENDITURE		DEFICIT	
Ton-Kilometers (thousands)	% of total	m$n.* (thousands)	% of total	m$n.* (thousands)	% of total	m$n.* (thousands)	% of total
13,287,248	24.5	4,262,928	25.0	8,661,496	33.1	4,398,568	48.4
2,656,849	4.9	1,123,397	6.6	1,878,567	7.2	755,170	8.3
13,610,237	25.2	4,113,815	24.1	5,438,205	20.8	1,324,390	14.6
10,576,432	19.6	3,288,075	19.3	4,576,817	17.5	1,288,742	14.2
8,856,068	16.4	2,721,255	16.0	3,356,946	12.9	635,691	7.0
5,036,827	9.3	1,487,879	8.8	2,110,524	8.1	622,645	6.8
51,847	0.1	37,237	0.2	101,511	0.4	64,274	0.7
54,075,508	100.	17,034,586	100.	26,124,066	100.	9,089,481	100.

Table 1

se the Grave Crisis on the Railways?

operation and from physical deterioration brought on principally by failure to adopt modern methods of operation and lack, until the present, of a vigorous and realistic policy of correction.

The problem is a complex one. It is difficult for anyone outside the system to realize just how the nation's railways could have reached their present state. The facts of the situation have, however, now been accepted by the government and public opinion as the nation's top issue. Such acceptance is the first essential step toward correction.

The annual railway deficit has reached a figure of approximately 23,000,000,000 pesos ($281,000,000 US). The magnitude of the loss is the more important since the government is embarked on a determined program of industrialization and has taken realistic steps to curb inflation and avoid further devaluation of the peso.

It was precisely at the time when inflation was beginning to take hold of the country that the government embarked upon nationalization of the railways and so brought about the unification of two systems, each radically different from the other in operating methods.

On the one hand, there were the privately-owned lines—of broad and medium gauge, which had been operated on strictly commercial principles. Then there was the state-owned narrow-gauge line, which had been built to meet the needs of large areas of the country that were sparsely populated. This line was operated for political and sociological objectives and had many services which did not pay their keep.

Moreover, it should be noted that the privately-owned railways, many years before nationalization, had run into financial difficulties, too. As a consequence, these lines suspended all modernization programs. Most of them had not been able to meet their obligations to shareholders. With the outbreak of the Second War, the railways were called upon to play a major part in the handling of heavy traffic for export. This brought temporary but welcome economic relief to these rail lines, but did not improve their physical condition. On the contrary, the impossibility of securing railway materials from abroad resulted in serious deterioration of their plant and rolling equipment.

Within the two groups of railways which, as a result of nationalization, comprised the new State Railways there were three categories of main and branch lines:

- Those which could be run with normal economic results (i.e., at a profit).
- Those which could attain a "break-even" point (no profit, no loss).
- Those which could be run only at a loss, but fulfilling a political and social necessity.

The majority of the lines which had comprised the former state-owned system were included in the second and third categories.

Today, however, the abandonment of unremunerative lines is an important

CONTINUED

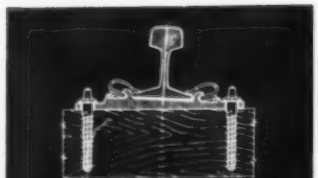
HEY-BACK

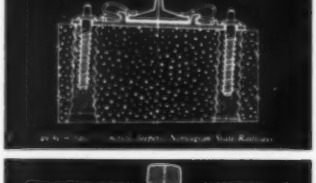
REGISTERED TRADE MARK

POSITIVE ELASTIC RAIL FASTENING

* Simple and self-securing
* Attractive in cost in view of reduced maintenance and replacement expenses
* Transversely stiff and vertically elastic
* Definitely anti-creep
* Equally serviceable on timber and concrete sleepers
* Excellently suited for pre-assembly
* Secure and safe
* Constant spring pressure on the rail at every point of contact independent of the means of securing the baseplate to the sleeper
* The best security against sun-buckling, irrespective of the length of rails
* Quicker and easier exchange of rails than by any other known method of rail fastening
* Track security and economy

The Hey-Back System comprises only two types of components—a rolled steel baseplate and a spring clip. The baseplates can be fastened by conventional methods. Once secured, they need never be disturbed. The spring clips are easily entered and driven home, and as easily released, yet resisting all forces caused by the movement of the train. Correct position of the spring clip is ascertained at a glance during routine inspections. Resilient pads can be used, both as shock-absorbers and to provide insulation for track signalling.





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ARGENTINE CRISIS CONTINUED

item of policy proclaimed by the government. It is timely, then, to examine the most recently available figures of the different railways (for the year 1959). These are shown in Table 1.

By distributing the figures according to the gauge of track, the results shown in Table 2 are obtained.

Table 2

Different Gauges Compared (Per Cents)

	Narrow gauge	Medium gauge	Broad gauge	Economic narrow gauge
Track length (km)	35.5%	8.1%	54.7%	1.7%
Staff employed	35.2%	7.1%	57.3%	0.4%
Passenger km	18.8%	5.2%	75.9%	0.1%
Freight ton-km	30.2%	5.8%	63.9%	0.1%
Gross ton-km	24.6%	4.9%	70.5%	0.1%
Total revenue	25.0%	6.6%	68.2%	0.2%
Total expenditure	33.2%	7.2%	59.2%	0.4%
Deficit	48.4%	8.3%	42.6%	0.7%

Table 1 makes it apparent that the ex-state railways (narrow gauge) were not built to operate as paying concerns. The mountain districts they served brought operating losses and the system as a whole was never a financial success. These lines, it will be seen from the table, accounted for almost 50% of the deficit suffered by the merged system in 1958–59.

The system is now confronted with the urgent need to rehabilitate and modernize practically its whole network. For example, urgent attention must be given to the shortage of motive power, if the crisis is to be overcome. A considerable amount of track must be replaced. There is a lack of trained supervisory staff and skilled labor, which causes maintenance to suffer.

This state of affairs came about, at least in part, from causes that were largely unavoidable. Nevertheless, the facts were not vigorously faced, notwithstanding their serious effect upon the economy of the country.

Passenger traffic increased considerably. In order to handle it, along with summer seasonal traffic, freight shipments often were allowed to stand for weeks in cars. Where the lading was perishable, losses were suffered. The nation lost large quantities of raw materials, due to frequent cancellation of scheduled freight trains. This problem of service inadequacy still exists and is causing profound anxiety in many parts of the country.

But there is more to the problem than inadequate service. The many operating problems which face the managements of the individual railway lines, together with increasing demands by the two labor union leaders, have almost wholly absorbed managements' attention. The railway system has not been greatly con-

cerned by inadequate financial returns, since losses have been covered by government subsidy. Relatively little attention could be given to the many commercial problems, since there have been other, more pressing problems to deal with.

Nothing was done, for example, to make the number of scheduled services conform to the number of available locomotives. More schedules than motive power brought about serious delays and caused a heavy increase in claims. Had each management of an individual railway been made responsible for the running of its own particular network, the results might possibly have been more favorable. There would at least have been more of an incentive to adopt methods to secure more favorable operating results.

The agreements signed with certain groups of employees within the unions brought about changes in the scale of wages and working hours which, in turn, diminished production and made necessary the employment of more workers.

To make things worse, many control groups were eliminated and for some years practically all statistics (essential for determining costs) were abandoned. Now the railways do have electronic computers which in time will solve the need for adequate statistics. But attainment of this result is being slowed down by the lack of experienced operators and adequate materials.

Difficulties continue to be experienced daily because of deficiencies in motive power; the poor state of repair of cars and coaches; the lack of automatic couplers and air brakes; and the poor state of the track which has necessitated many speed restrictions. There are other difficulties over which managements have no control, e.g., strikes (partial or total), excessive delays on turnaround of cars at the ports, due to the reduction in working hours at these places. For example, the National Grain Board which operates most of the elevators does not work its forces on Saturdays or holidays.

Seasonal traffic, sometimes involving long distances with perishable goods, must be handled with a top priority. Yet little, so far, has been done to modernize the equipment for adequate handling. A lot of good traffic is completely neglected.

The lack of adequate service, until it is corrected, will continue to be a drain on the national economy, and will put a brake on all possible expansion of the railways.

The situation has been allowed to drag on and nothing done to confront the rail deficit. This deficit has now reached a

CONTINUED

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RAILROAD EQUIPMENT

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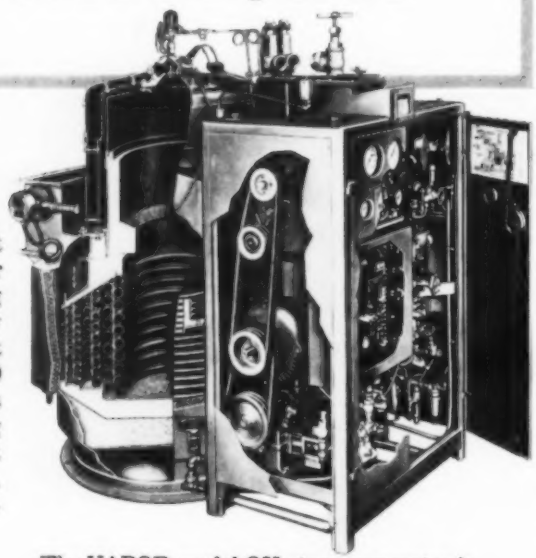
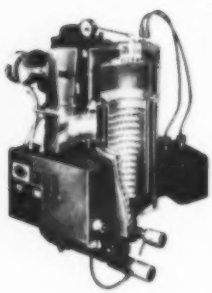
serving railroads for over 50 years



VAPOR equipment for steam, hot water or electric heating has been used by railroads throughout the world for over 50 years. Vapor makes complete heating systems—heat source, radiation, valves and thermostatic controls.

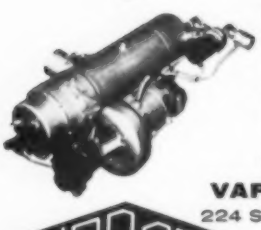
The VAPOR model OK steam generator is light, robust, reliable and compact. Statistics of OK-4616: sustained output—750 kg/h; weight—1,350 kg; overall dimensions—165 x 110 x 160 cm. Similar models available with outputs ranging from 225 to 2,000 kg/h.



The VAPOR Thermostat shown here is one of the models designed for railroad heating and air conditioning systems. VAPOR Thermostats manufactured to rigorous standards flatten the curve of temperature variation to within one degree centigrade.

EQUIPMENT MADE IN HOLLAND

Also illustrated is the compact VAPOR W-120 Circulating Water Heater (approx. 115 kg and 70 x 40 x 48 cm, with 32,000 kg Cal/h output) for heating diesel railcars and locomotives. Automatically maintains temperature of engine coolant to assure full operating efficiency.



Also available for lower heat output requirement the B-70 heater with a capacity of 16,000 kg. Cal.

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ARGENTINE CRISIS CONTINUED

point where, as had been said in the press: "We must either finish with the railway deficit or the railway deficit will finish us."

Although most of the railways have some diesels, these are badly in need of repair and failures are common. Some locomotives are up in the 750,000-km range without having been in for a general overhaul.

Labor is giving trouble and unfortunately the leaders of the unions in many cases have lost control of the situation.

Facing these facts, the government has now taken measures to relieve the situation. A decree has been issued, taking effect from 2 July, whereby all railroad employees who are 50 years of age and have 30 years service are obliged to retire on pension. An estimated 6,400 persons are affected.

This measure will have impact quite beyond the number of persons, because it will affect to a large extent supervisory and officer personnel. It is understood that some offices will have no one left with authority to carry on the work.

It is believed that the new decree is one of the first steps in the overall plan to reduce the number of employees by 16,000.

Further Governmental measures include: a complete organic and functional reorganization of the Railway Board (E.F.E.A.); a modification of the working rules; elimination of certain organizations attached to the Ministry of Transport; sale of surplus railway property and the elimination of 32 business cars used by senior officers, as well as half of the service automobiles.

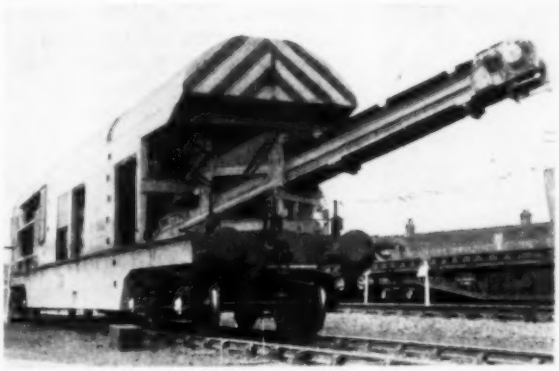
The official attitude toward increases in rates and charges has undergone a big change. From 1 August goods and livestock rates were increased by 25%, and main-line passenger fares went up by only 40% instead of the 50% originally proposed.

Opposition has been met with in almost every sector. Branch line closures, transfer of services to private interests, and sale of surplus property have been particularly unpopular moves.

The following branches are definitely to be axed: Vedia-Pergamino, General Villegas-Patricios, Empalme San Carlos-Galvez and Roversi-Campo del Cielo on the General Belgrano Railway; and General Lorenzo Vintter-Coronel Francisco Sosa on the General Roca Railway.

It remains to be seen how adequate these measures will be. The opportunities for improvement are boundless—both as to more adequate transportation service, and in the removal of the railway deficit as a burden on the government's finances.

Products of Interest



Ballast Cleaning Machine

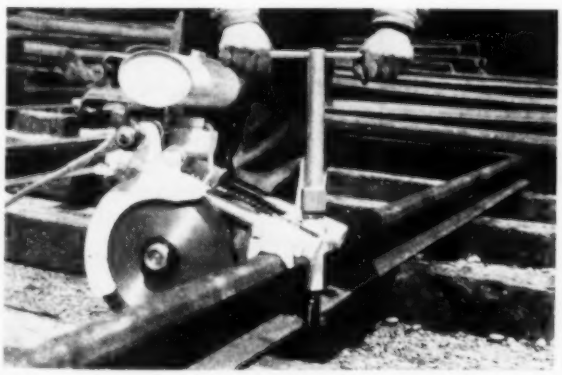
Machine de nettoyage pour un drainage efficace du ballast.
Schotterreinigungsmaschine für wirksame Entwässerung.
Máquina limpiadora de balasto asegura drenaje eficiente.

The Hunslet ballast cleaning machine ensures efficient drainage through the ballast with the minimum of line occupation. When working it cleans the ballast in the shoulder and the six-foot at operating speeds up to 548 meters/hour. It is a self-propelled vehicle capable of traveling from stabling point to working site under its own power. Two digging heads are provided, one on each side of the machine. *The Hunslet Engine Co. Ltd., England.* **IRJ 1**

Hy-Rail Equipment for Bus

Autobus rail-route de huit places.
Achtplätzer-Autobus fährt auf Strasse und Schiene.
Autobús para ocho puede operar en carretera y ferrocarril.

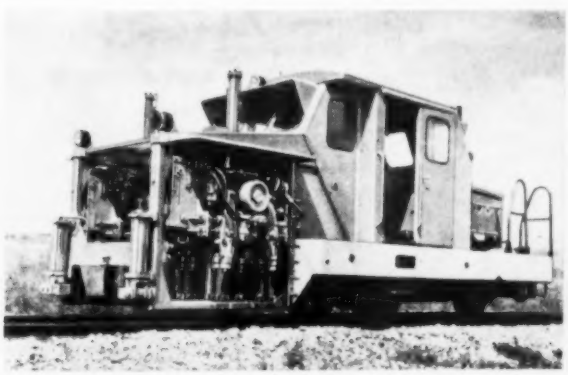
An eight seat station bus has been adapted for operation on either road or rail. Some body modification has been necessary at the lower front corners to make room for the guide wheels when in the raised position. A hydraulic turntable is available as an extra. The Hy-Rail equipment for adapting the bus is available for mounting by the customer, or complete unit with rail equipment in place can be supplied by the manufacturer. *Fairmont Railway Motors, Inc., USA.* **IRJ 3**



Circular Saw Cuts Rail Sections

Scies circulaires coupont des rails standard en quatre minutes.
Kreissäge schneidet Normalschiene in vier Minuten.
Sierra circular corta rieles standard en cuatro minutos.

Rails of all sections can be cut off to tolerances of 1 0,1 mm (1/256 in.) by a Swiss made circular saw. It is claimed that even if they are mounted on sleepers, the rails can be set up, adjusted and cut off easily and quickly by a single operator. Figures supplied by the manufacturers show that precision cutting of standard rails have been achieved in four minutes by one man. *Société Industrielle des Métaux Manufacturés S.A., Switzerland.* **IRJ 2**



B-60 Heavy Ballast Tamper

Nivellement parfait par un seul agent lors de bourrage normal.
Ein Mann erzielt genaue Nivellierung bei Normalkrampung.
Nivelación perfecta por una sola persona en tiempo normal.

The Matisa automatic heavy ballast tamper, type B-60, can be fitted with the manufacturer's automatic leveling equipment. This will accurately position the track in longitudinal and transverse profiles by the use of two lifting jacks and ensures precise and positive leveling to within ± 1 mm without lowering the normal output of the tamper. Combined in this manner, the entire leveling work can be performed by a single operator. *Matisa Equipment Corp., Switzerland.* **IRJ 4**

Colombi

Work was rushed this summer to complete work on the Atlantic Railway in northern Colombia in time for inauguration of the road on 29 July. The new line extends northward from La Dorada and Puerto Salgar to Fundacion—a distance of 672 km. Construction has been under way for almost nine years.

Concurrent with progress on the Atlantic line, considerable work has also gone into improving other portions of the Colombia railway system. With these projects under way and the Atlantic line now complete, estimates of further increases in traffic volume are being made. The railways, which have required financial assistance from the national budget for some time, are now expected to become financially independent by 1966.

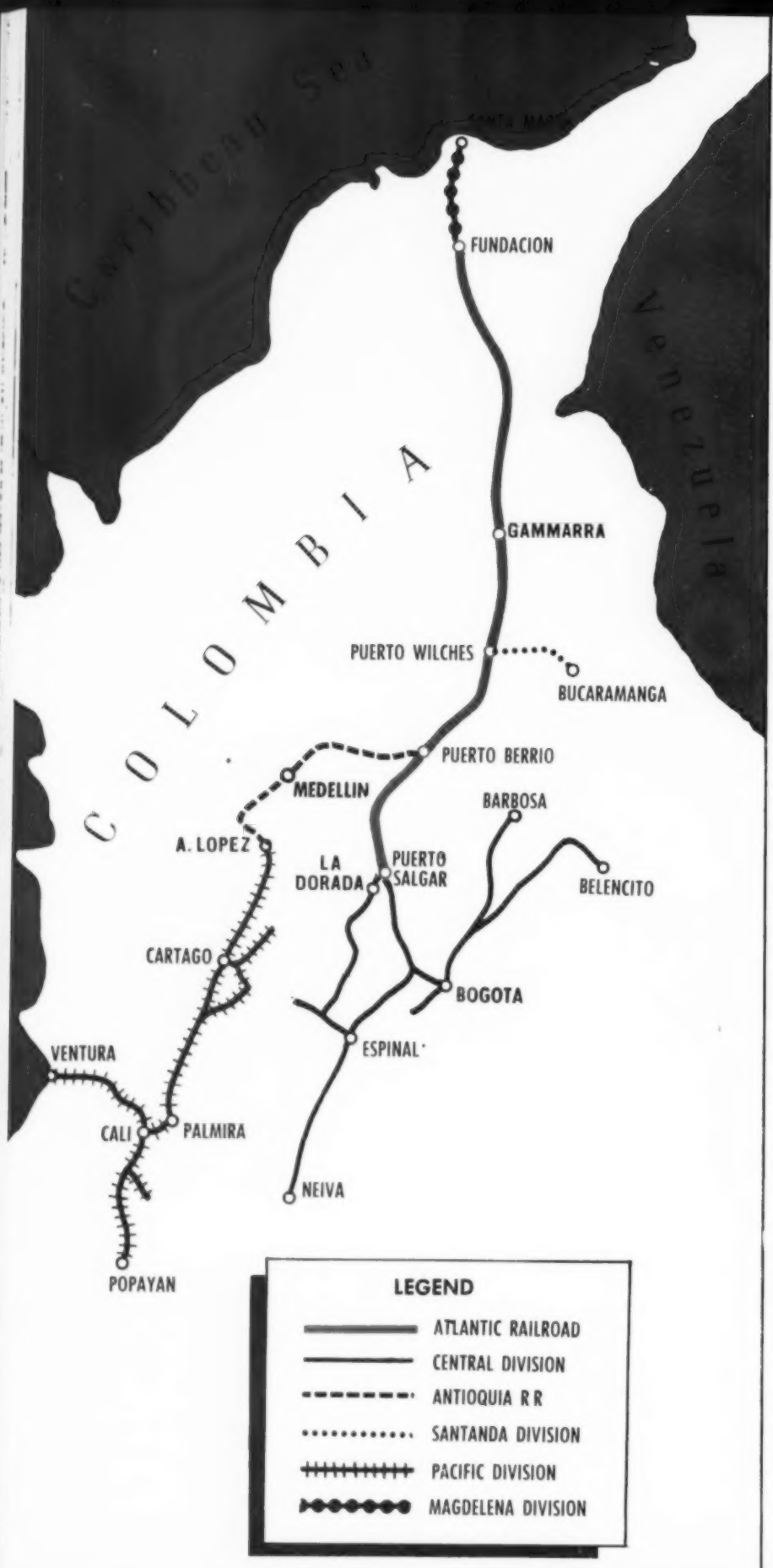
The new Atlantic Railway—together with the existing but much improved Fundacion-Santa Marta line—provides central Colombia with a long desired rail link to the Caribbean Sea (see map).

Until now, freight service to and from Bogota, the capital, and other interior cities has been largely dependent upon barges on the Magdalena river. These barges, having made their way upstream from Santa Marta to railway connections at Puerto Berrio and Puerto Salgar, have in the past required days to reach inland destinations. In dry seasons the river became impassable. This traffic can now be handled by rail in a matter of hours, both inbound and outbound. Passenger trains between Santa Marta and Bogota are being scheduled for a sixteen hour run via the new Atlantic rail route.

Moreover, the new railway line opens the rich Magdalena valley for development, thus providing a further boost to the economy of the country.

Despite the many benefits, however, Colombia's decision to construct the new railway was not an easy one. The line would, and does, traverse rugged terrain —swampland, hills and sharp ridges, numerous streams and dense undergrowth. Original surveys of the route were made from the air, using aerophotogrammetry. It was apparent very early that construction of the line would be a long and difficult task, as well as an expensive one.

Financing was not an insurmountable problem, as things developed. The cooperation of the World Bank was enlisted as early as 1948. A special mission, headed by Dr. Lauchlin Currie, went to Colombia in July 1949 to conduct economic studies. One major result of this



New Atlantic Line Completed

work was a recommendation favoring construction of the new line—then referred to as the "Magdalena Valley Railway." Thus the World Bank obtained information from which it could appraise financial needs should the Colombian government decide to proceed with the railway project.

Such a decision was not long forthcoming. The Colombian Congress in 1952 authorized the government to build a new railway between La Dorada-Puerto Salgar and the city of Gammarra. At the same time, approval was given for the first World Bank loan of $25,000,000 (US).

Construction work began in 1953 and during the next two years work proceeded. This initial work was on two segments: Puerto Salgar—Puerto Berrio; and Bucaramanga—Puerto Wilches. The original contracts for the performance of this work expired at the end of 1954.

It was during the following year, 1955, that the government decided to extend the new railway to Fundacion from the terminal originally planned at Gammarra. The added distance was 270 km. At this time, the name of the railway was changed to its present one. Simultaneously, it was realized that the Fundacion-Santa Marta line would require improvements to bring it up to the standards of the modern Atlantic line. Studies were initiated.

Funds for this extension beyond Gammarra were obtained, in part, by a second World Bank loan. This advance, totaling $15,900,000, was obtained by the National Railway system, in contrast to the first loan, which had been obtained by the government itself. Thus, in total, the World Bank provided $40,900,000 toward the construction project. In addition, the Colombian government appropriated in excess of 500,000,000 pesos.

Meanwhile, no less than twelve firms, both foreign and domestic, were at work clearing the route for the new line, building embankments, laying rail and ballasting.

Reports which were issued from time to time gave indication that the construction was uncommonly difficult. During dry seasons, earth was moved into swamp areas in quantity. Each year a portion of this fill was lost when the rains set in. But headway was made and the roadway gained solidity. Altogether, the earth moved during construction of the railway was approximately 30,000,000 cu meters.

Hundreds of culverts were installed, along with large and heavy bridges.

As shown on the accompanying map, the new railway is an integral part of the Colombian railway system. A final step in completing the system is being taken this year when separate operation of the Antioquia Railway (Puerto Berrio—A. Lopez) will be discontinued and the line will be absorbed into the national system. The entire system is meter-gauge.

During the years 1958–60, concurrent with progress on the Atlantic line, considerable work also went toward improving other portions of the system and its operation. Goals were established for increased freight and passenger traffic, more efficient operation and reduced percentages of rolling stock out of service.

A measure of the improvements expected within the next four years is contained in a Four-Year-Plan for 1961–1964: net revenues, estimated at 39,200,000 pesos in 1961, are expected to increase to 65,100,000 pesos in 1965. This increase is anticipated as a result of larger traffic volume, complete unification of the railway network and lower unit costs brought about by further increases in efficiency. Traffic increases are expected to average 5% per year, assuming the physical improvements which are contemplated in the Plan can be consummated.

Improvements included in the Four-Year-Plan are understood to include extensive track rehabilitation on older lines, rebuilding or replacement of rolling stock and conversion of all steam motive power to diesel. Financial needs for the program have been estimated to be 259,000,000 pesos and $32,600,000 (US).

The steam-to-diesel conversion will require a total of 104 diesel units between now and 1965. With improved utilization of freight cars, and longer average runs in kms, the railway system estimates its 1961 freight car needs at 3,615. This figure can probably be supplied from the present fleet with improved maintenance. If traffic estimates for the future are realized, however, this car fleet need will increase to approximately 4,275 cars in 1965, and some new purchases will be required.

For the present there is a reported need for 35 first-class passenger coaches, 51 regular coaches and six restaurant cars, all for use on the Atlantic Railway.

A start in the expanded dieselization program has already been made. Early in 1961 a World Bank loan of $5,400,000 (US) was obtained for use in acquiring freight cars and locomotives for use on the Atlantic line. Orders for the motive power were placed with General Electric Co., for 15 locomotives costing $2,600,000. Six of these new units are 1,420 hp, eight are 900 hp, and one is 700 hp. All can be operated in multiple, and are equipped with dynamic brakes.

Achèvement d'une nouvelle ligne ferroviaire en Colombie

Ces dernières semaines, on a travaillé d'arrache-pied à l'achèvement du nouveau chemin de fer atlantique, dans le nord de la Colombie. La nouvelle ligne, dont la construction a duré presque neuf ans, s'étend sur 672 km et relie La Dorada et Puerto Salgar à Fundacion, où elle rejoint l'ancienne ligne conduisant à Santa Maria, port de la mer des Caraïbes (voir la carte).

Neue kolumbische Eisenbahnlinie beendigt

Während vergangener Wochen wurden die letzten Arbeiten zur Eröffnung der neuen Atlantischen Eisenbahn in Nordkolumbien eiligst zu Ende geführt. Die neue Linie, deren Bau fast neun Jahre gedauert hat, führt nordwärts, über eine Strecke von 672 km, von La Dorada und Puerto Salgar nach Fundacion. Dort vereinigt sie sich mit der bestehenden Linie nach Santa Maria, dem Seehafen am Karibischen Meer (siehe Karte).

Se ha terminado una nueva línea en Colombia

Durante las últimas semanas se han terminado los trabajos finales para la inauguración del nuevo Ferrocarril Atlántico en Colombia septentrional. La nueva línea se extiende hacia al norte desde La Dorada y Puerto Salgar hasta Fundación—una distancia de 672 km. La construcción ha tomado casi nuevo años. En Fundación el ferrocarril se une con una línea ya existente entre esta ciudad y el puerto de Santa María (véase el mapa).

Britain Tests Freight Car Brake

The first freight cars to use disc brakes in regular service are running express schedules on British Railways. The brake makes use of the wheel itself as the disc and is undergoing large-scale trials on 212 cars.

The first vehicles equipped were 62 21-ton capacity hopper cars. They were selected because the hopper doors in the bottom of the cars normally interfere with conventional power brakes. Disc brakes could lead to important economies in maintenance as the smaller friction pads have a longer life-time than cast-iron shoes. They also achieve a more consistent braking performance and have much better heat dissipation.

The adaptation of disc braking for freight cars has been developed under the direction of the Chief Mechanical Engineer of the BTC's Central Staff, in conjunction with Girling Ltd. The 212 cars which will be used for the large scale trials consist of 62 21-ton hopper cars, 50 16-ton open cars and 100 24½-ton hopper cars.

The 62 cars which form the first batch are being used on express bulk coal trains between Mansfield (Nottingham) and Palace Gates (London) and are scheduled at almost passenger train speeds. The 100 24½-ton hoppers will be used to carry coal between the Kent coalfield and a new power station at Richborough, Kent. Again, they will run on fast schedules which have to be worked between a frequent service of electric passenger trains. All the 212 cars will be completed by the end of the year.

The automatic two-stage disc brake consists essentially of a double-fulcrum device mounted on a horizontal diaphragm type vacuum cylinder. Either of the two fulcrum points is selected automatically by a loaded or empty vehicle. The force from the vacuum cylinder is transmitted via the leverage selected to a caliper mechanism which forces non-metallic brake pads against machined faces on the webs of the rail wheels.

As it is so compact, this design of disc brake is well suited to cars having bottom discharge doors. On a four-bottom-door hopper car, the equipment fits neatly into the apex between hoppers without interfering with existing door gear. No transverse equalizing beams are needed and the axles are clear of obstructions enabling existing car moving equipment to be used.

A 35.5-cm diameter diaphragm cylinder is used in conjunction with an automatic single acting slack adjuster to operate the disc brakes. On the hopper cars two sets of equipment are provided—one for each pair of wheels—but on the 16-ton standard mineral cars, one set is used for both pairs of wheels.

The cylinders are rigidly attached to the frame and a spherical bush is fitted in the cylinder cover to allow angular movement of the piston rod to suit the brake rigging. The piston rod is enclosed in a PVC miniature sack which also acts as a vacuum-tight seal to isolate the train pipe side of the cylinder from the atmosphere. A standard combined ball and release valve is also provided. The slack adjuster is controlled by an actuating plate secured to a fixed point on either the cylinder or one of the rigging supports according to the type of car. A maximum take up of 15.2 cm is catered for.

The brake pads are replaced when the friction material has worn down to a thickness of 7 mm and worn condition can be determined by a visual examination of the pad without having to remove it from the shoe.

A diaphragm type vacuum cylinder is mounted rigidly on the vehicle underframe. A fulcrum bracket 'A', secured to the cylinder, supports twin levers 'B', the upper ends of which are pivotally attached to the cylinder rod, the lower end being connected via a slack adjuster to the caliper mechanism. The levers 'B' are normally supported by the pin 'C', which in the tare condition is free to slide in a slot in the fulcrum bracket.

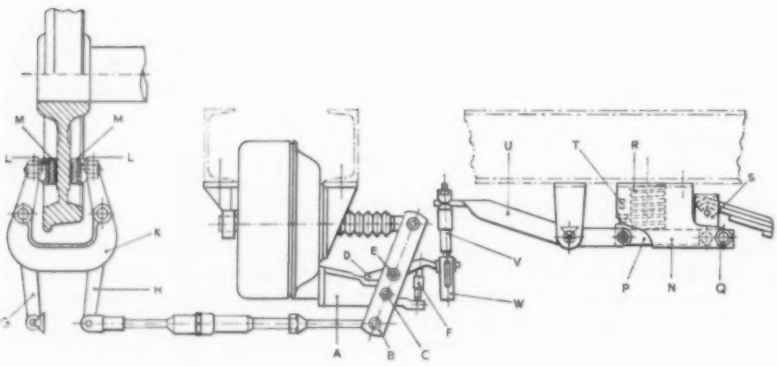
With the vehicle in the empty condition a fulcrum strut 'D' pivotally connected to the levers 'B' by fulcrum pin 'E' is held into an abutment on the fulcrum bracket 'A' by spring 'F'.

When the cylinder applies a force to the levers 'B' the latter pivot about the pin 'E' and have an effective leverage of 1/1.

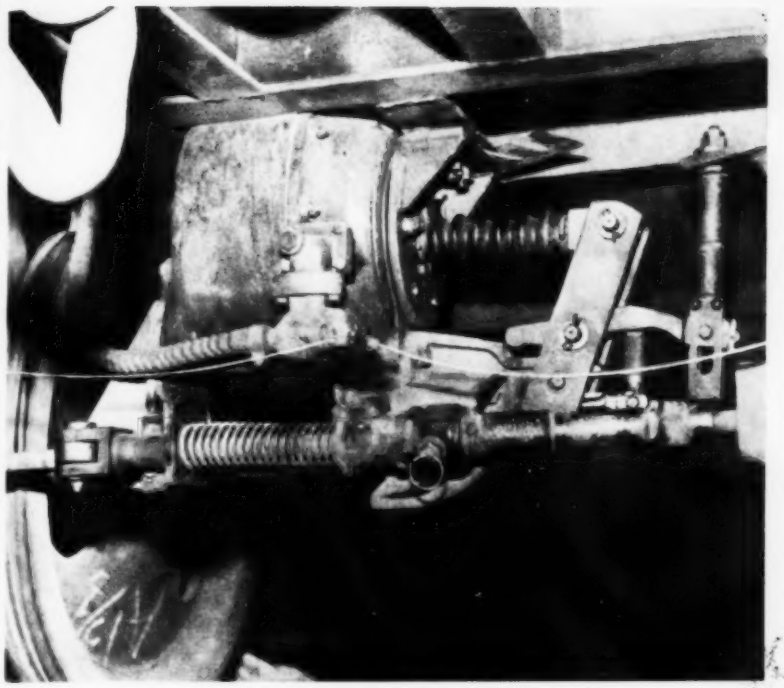
When the vehicle is loaded the fulcrum strut 'D' is caused to pivot out of engagement with the abutment face. The levers 'B' thus pivot about the pin 'C' which abutts against the bottom of the fulcrum bracket slot giving an effective leverage of 2½/1.

The caliper mechanism comprises two levers 'G' and 'H' pivotally connected to a yoke 'K' and having at their inner extremities pivoted brake shoes 'L' carrying brake pads 'M'. The outer end of lever 'G' forms a fixed fulcrum attached to an underframe bracket whilst the corresponding end of lever 'H' is connected to the slack adjuster and is guided in a slotted support bracket. The caliper is supported at the shoes by suspension links which take the braking drag force and restrain the shoes substantially parallel to the braking faces on the rail wheel, whilst allowing the mechanism to float with any axial movement of the wheel.

A pressed bracket 'N' of channel form



Two-stage disc-brake showing brake mechanism in tare condition of vehicle with brakes off



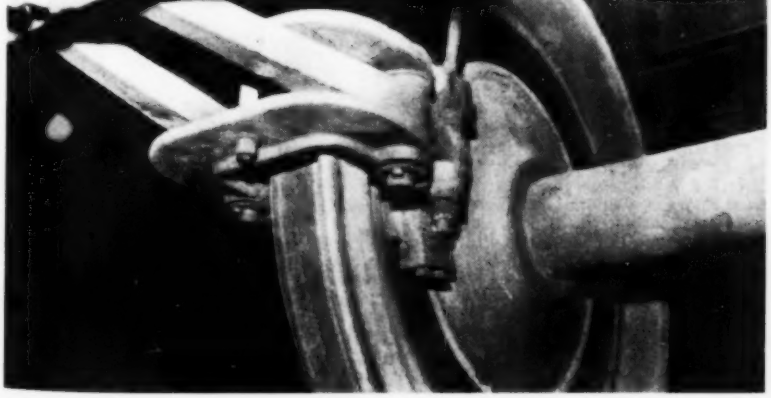
Underside of 21-ton hopper car with vacuum cylinder, 2-stage changeover gear and slack adjuster

is attached to the vehicle solebar adjacent to one end of the wagon spring. A beam 'P' pivotally attached to the bracket by pin 'Q' is forced downwards against a stop by a spring 'R'. One end of the wagon spring is supported by a stirrup 'S' attached to the beam 'P', the load (including dynamic effects) so applied being carried by the spring 'R' without deflection.

When the wagon is loaded to 66% capacity the spring 'R' is compressed, and the beam 'P' abutts against the stop 'T'. In this position the spring 'R' is designed to cater for dynamic loading without forcing the beam 'P' away from the stop 'T'. Thus there is no flutter of the mechanism in either position provided the wagon is empty or loaded to a minimum of 66%.

Movement of the beam 'P' is transmitted via a pivoted arm 'U' and a compression spring 'V' to the fulcrum strut 'D', thus selecting the appropriate fulcrum pin in levers 'B'.

The spring 'V' and slotted clevis 'W' enable a vehicle to be loaded or unloaded with the vacuum brake applied without damage to the mechanism or involuntary release of the brake. Normal release of the vacuum brake will then allow the mechanism to select the appropriate fulcrum and successive brake applications will be at the correct ratio for the weight.



Integral rail wheel and brake disc showing application of caliper gear

Essais de freins à disques

Les Chemins de fer britanniques utilisent actuellement les premiers wagons pourvus de freins à disques dans des trains directs de marchandises réguliers. Les essais portent sur 212 wagons, dont les roues servent de disques. Furent d'abord équipés 62 wagons de 21 tonnes à décharge automatique, les clapets de décharge gênant généralement les appareils de frein ordinaires. Les frais d'entretien sont moindres, car les mâchoires du frein sont plus petites et durent plus longtemps que les sabots en fonte de fer. Par ailleurs, grâce à une meilleure répartition de la chaleur, l'action du freinage est plus constant.

Versuche mit Scheibenbremsen

Die Britischen Bahnen verwenden gegenwärtig die ersten mit Scheibenbremsen versehenen Güterwagen in regelmässigen Schnellgüterzügen. Bei den auf 212 Wagen ausgedehnten Versuchen werden die Räder als Scheiben benützt. Zuerst wurden 62 21-t-Selbstentladewagen ausgerüstet, da die Trichterklappen solcher Fahrzeuge gewöhnlich mit üblichen Bremsen in Konflikt kommen. Das Scheibenbremssystem sollte wichtige Einsparungen an Unterhaltskosten ermöglichen. Die kleineren Bremsbacken haben eine längere Lebensdauer als gewöhnliche gusseiserne Bremsklötze und führen, durch bessere Hitzeverteilung, zu einer beständigeren Bremswirkung.

Ensayos con Frenos de Discos

En los Ferrocarriles Británicos recorren actualmente los primeros vagones que utilizan frenos de discos. El freno utiliza la rueda misma como disco y pasa por ensayos en 212 vagones. Los primeros vehículos equipados del freno eran 62 vagones-tolva, cuya capacidad era de 21 toneladas. Fueron escogidos, porque las puertas de las tolvas en el suelo de los vagones impiden normalmente el funcionamiento de frenos convencionales. Los frenos de discos podrían conducir a importantes economías en la conservación, ya que los platillos de fricción más pequeños son más resistentes que las zapatas de hierro fundido. Se logra también un frenado más consistente con una mejor disipación de calor.

Railway Bookshelf

Seven Years of Transport and Communications in The Egyptian Region of the UAR (Ministry of Communications, Cairo; 151 pp.) — A general summary of the ministry's work since the 1952 revolution, this booklet discusses in detail the first and second Five Year Plans (see also IRJ, January, p. 39) as well as general transport policy. Dieselization, suburban electrification, railway service for the High Dam and the Helway steel plant, rolling stock modernization and domestic production, engineering and personnel are all dealt with. Altogether 33 pages are devoted to the railway system. The rest of the report is concerned with the related road and inland waterways programs, and with telecommunications and postal service. The text is supported by charts and diagrams, and by photos ranging in quality from fair to poor. (English)

A Fresh Approach to Diesel-Electric Locomotive Design by John C. Aydelott (American Institute of Electrical Engineers, Conference Paper number CP 61-256; 10 pp. plus five diagrams) — This paper is a good general description of the design and development thinking incorporated in the General Electric U 25 B, the company's first bid to enter the mainline (2500 hp) diesel locomotive field for US sale. While the author's personal involvement with the locomotive (he is a member of GE's engineering staff) obviates a critical approach, traction engineers will find it of considerable interest. (English)

Benguela Railway — (Companhia do Caminho de Ferro de Benguela, Rua do Ataide 7, Lisbon or 95 Gresham St., London EC2) — In a 36-page pamphlet the Benguela has issued a general description of the 1.067-meter line connecting the Angolan port of Lobito with Katanga and the railway systems of Central and South Africa. A full account of the railway's services and equipment is given, together with information on the Port of Lobito and trade and travel information for Angola. (English)

The Swiss Federal Railways Electrification Completed (SBB/CFF, Bern) — Issued, as the title indicates, to mark the virtually complete electrification of Swiss Federal trackage, the 142-page booklet discusses all phases of the electrification – the historical development, motive power, power supply, civil engineering, economics, personnel, and operation. W. Wenger, the system's chief press officer, has added a light touch in a chapter titled "Playing at Railways" — a short discussion of the impact railways have had on the public imagination, and on the work of poets and writers.

The booklet is laid out in readable style, with an abundance of excellent photographs and many drawings and diagrams; a few awkward "literals" mar the translation in the English edition, but not seriously, and the cover painting by Fritz Bühler is a striking example of modern railway art. (French, German and English editions.)

Facts and Figures: Japanese National Railways (JNR Foreign Department, Tokyo) — A handy pocket guide to the JNR, largely in the form of statistical tables and charts, this 64-page booklet covers virtually every sector of JNR operations. (English)

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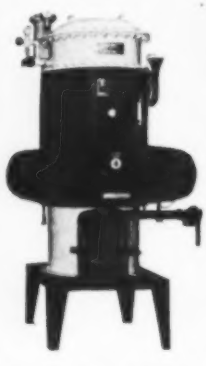

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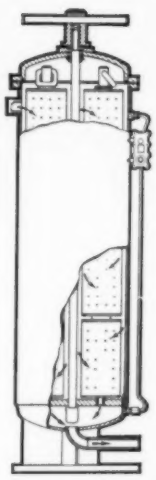

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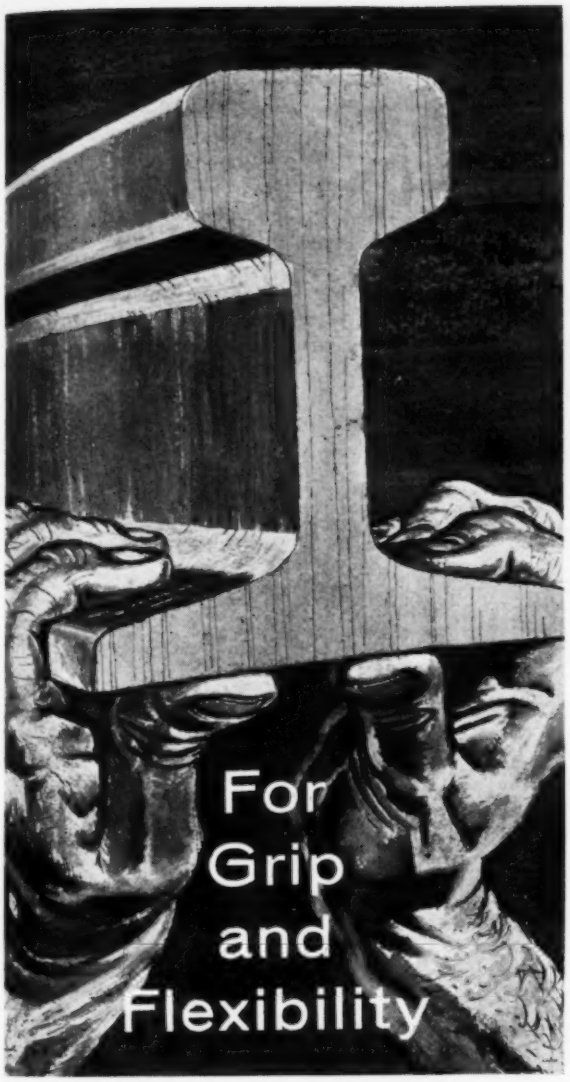

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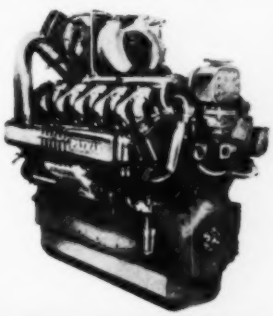

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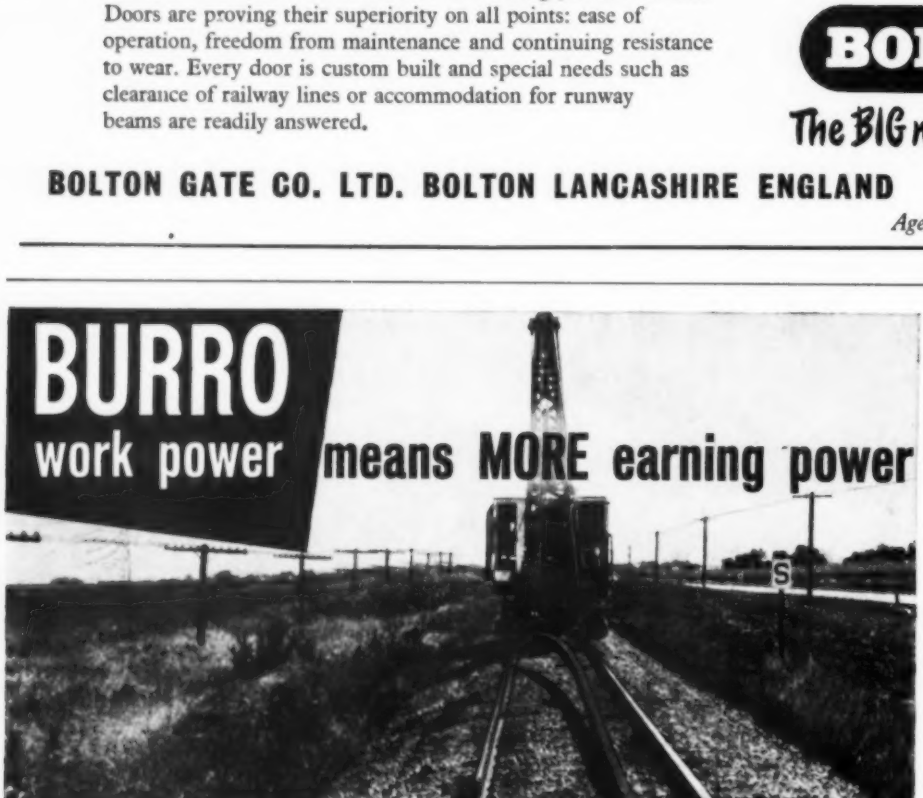

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... A 2000-hp English diesel locomotive has set a new standard on Rhodesia Railways by establishing a record mileage of 14,062 miles (22,534 km) per month. The locomotive was in use for 694 hours out of 744—an availability of roughly 90%.

SOVIET UNION: Commenting upon production figures in a number of industrial categories, Pravda recently criticized locomotive manufacturers for falsifying their records in order to over-fulfill their quotas. In particular it was critical of the 1960 figures which placed production at 1,303 mainline diesel and 396 mainline electric locomotives. Pravda now reports the following production figures for the first half of 1961: mainline diesels, 721—an increase of 116% over the corresponding 1960 figure; and mainline electrics, 262—an increase of 126%. During the same period, railway transport fulfilled or overfulfilled the plan for movements of all commodities excepting timber. The railways carried a total of 976.5 million tons of freight, an increase of 106% over the 1960 figure, and some 163 million tons more freight than that carried by motor transport. It is further reported that goals for the reduction in turnaround time for freight wagons and the increase in the weight of trains and their commercial speeds were met. Plans for raising labor productivity and cutting transport costs were over-fulfilled.

... Following reports in IRJ (July, p. 32) that automation experiments were taking place on the underground railway systems of Kiev and Leningrad, it is now stated that initial tests of a remotely controlled underground train held in Moscow have been successfully carried out.

... The laying of a second Trans-Siberian Railway is stated to have been discussed at a national Russian transport conference in Moscow. The line would stretch from the Urals to the Pacific over a distance of some 6,000 km. The project would promote settlement of the north eastern areas of the Soviet Union.

SWAZILAND: A decision to construct a new railway link between this British protectorate and Mozambique is reported under consideration by the British Government. Cost of such a line has been estimated at approximately 24,000,000 rand (1 rand = US $1.40).

SWEDEN: The center of what will be the largest CTC system in Europe at Ånge now controls a section comprising 23 stations and 173 km of track. On completion of the Langsele-Mellansel section by the end of the year, a further 10 stations and 91 km of line will be under CTC operation. During 1962 an extension will be made to Ljusdal, comprising 90 km with 13 stations. The entire CTC system will then cover 358 km with 43 stations.

SWITZERLAND: Swiss Federal Railways concluded operations in 1960 with its best profit record in 50 years—SF 31.4 million. Passenger traffic receipts (40% of total operating receipts) rose to SF 392.7 million. Freight receipts rose to SF 599.7 million, largely as a result of import-export and transit traffic. International freight traffic now accounts for 70% of the freight tonnage handled by the Swiss Railways.

TAIWAN: Installation of new centralized traffic control equipment on the line between Changua and Tainan has been completed. As a result, capacity of the line has been increased from 64-70 trains per day to 80-100. Passenger train performance has improved also, with on-time service now averaging 87% in contrast with 69% previously.

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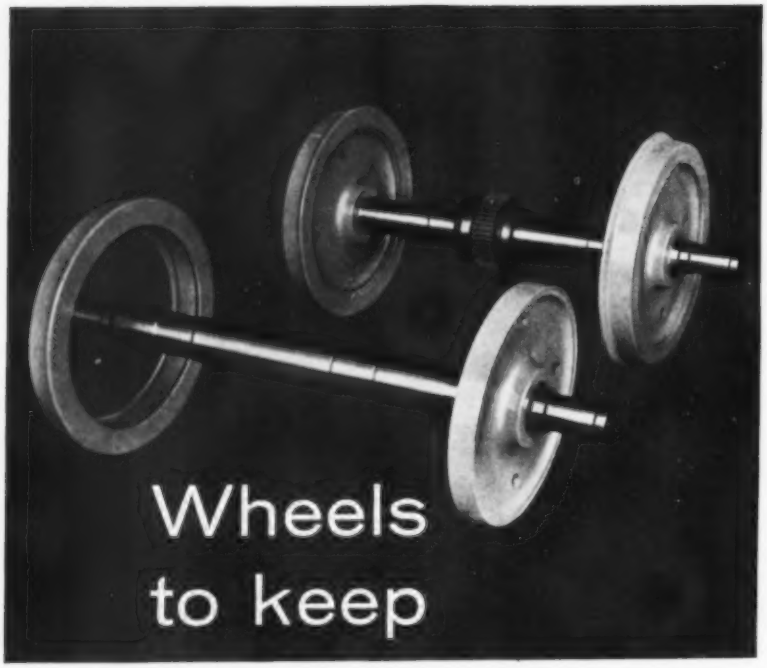

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LETTERS TO IRJ

French Suburban Electrics

Paris

To the Editor:

With reference to your article, "France: New Suburban Electrics," in the July, 1961 issue of the International Railway Journal, we would like to inform you that the automatic brakes which will be used on this equipment are being manufactured by Compagnie des Freins et Signaux Westinghouse—Paris and are Westinghouse JMR type brakes. We are also furnishing the compressors for the pantograph levers (type CF. 90) and the principal compressors (type Westinghouse 242).

J. Mantoux
La Chef de la Division Air Comprimé
Compagnie des Freins et Signaux
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Removable Snow Plow

Kassel, W. Germany

To the Editor:

In the March 1961 issue, the International Railway Journal describes a removable snow plow under the heading "New Japanese Rotary Plow." A diesel-hydraulic unit, which can be used either as rotary snow plow or as locomotive, was built for the Japanese State Railway. The removable snow plow is of the single axle wheelbarrow type.

In this connection we would refer to the fact that the German patent No. 1 091 144 has been granted to us for an electrically operated rotary snow plow rail vehicle, with the following principal claim:

"Electrically operated rotary snow plow rail vehicle which can be coupled to a diesel-electric locomotive (or other internal combustion engine). The rotary snow plow, equipped with one or more rotary shafts driven by one or more electromotors installed in the rotary snow plow unit is characterized by the fact that electric current for the motors of the rotary snow plow is supplied by the generator set of the diesel-electric locomotive which is to provide the pushing effort."

Thus, the idea realized in the Japanese snow plow has been protected for us by patent No. 1 091 144 in the German Federal Republic.

Henschel-Werke GMBH

Correction

International Railway Journal regrets that a drawing of a transistorized level crossing system manufactured by Pintsch Bamag AG, West Germany, which appeared on page 48 of the July issue was incorrect.

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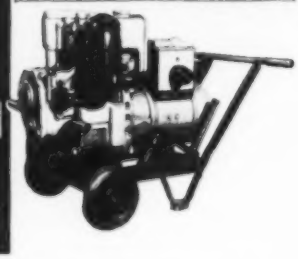

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INTERNATIONAL LETTERS—Trainmaster W. B. Kennedy of the Illinois Central Railroad, Main and Calhoun streets, Memphis, Tennessee, USA, would like to correspond with railwaymen in other parts of the world. He is now exchanging letters with some New Zealand railwaymen, and his wife is corresponding with their wives. If any of our readers, anywhere in the world, would care to exchange letters with Mr. Kennedy on railway matters, feel free to address him, as above.

THE "AVERAGE" TEMPTATION—A habit, born in the days of railway monopoly of transportation, that still persists, is that of using arithmetic averages as the answer to many problems of quantity. On the US railways, for example, rental of cars is paid for at an average price "per diem"—whether the car involved is worth $2,000 or ten times that sum. Rental on this basis encourages, of course, the retention in service of over-aged cars.

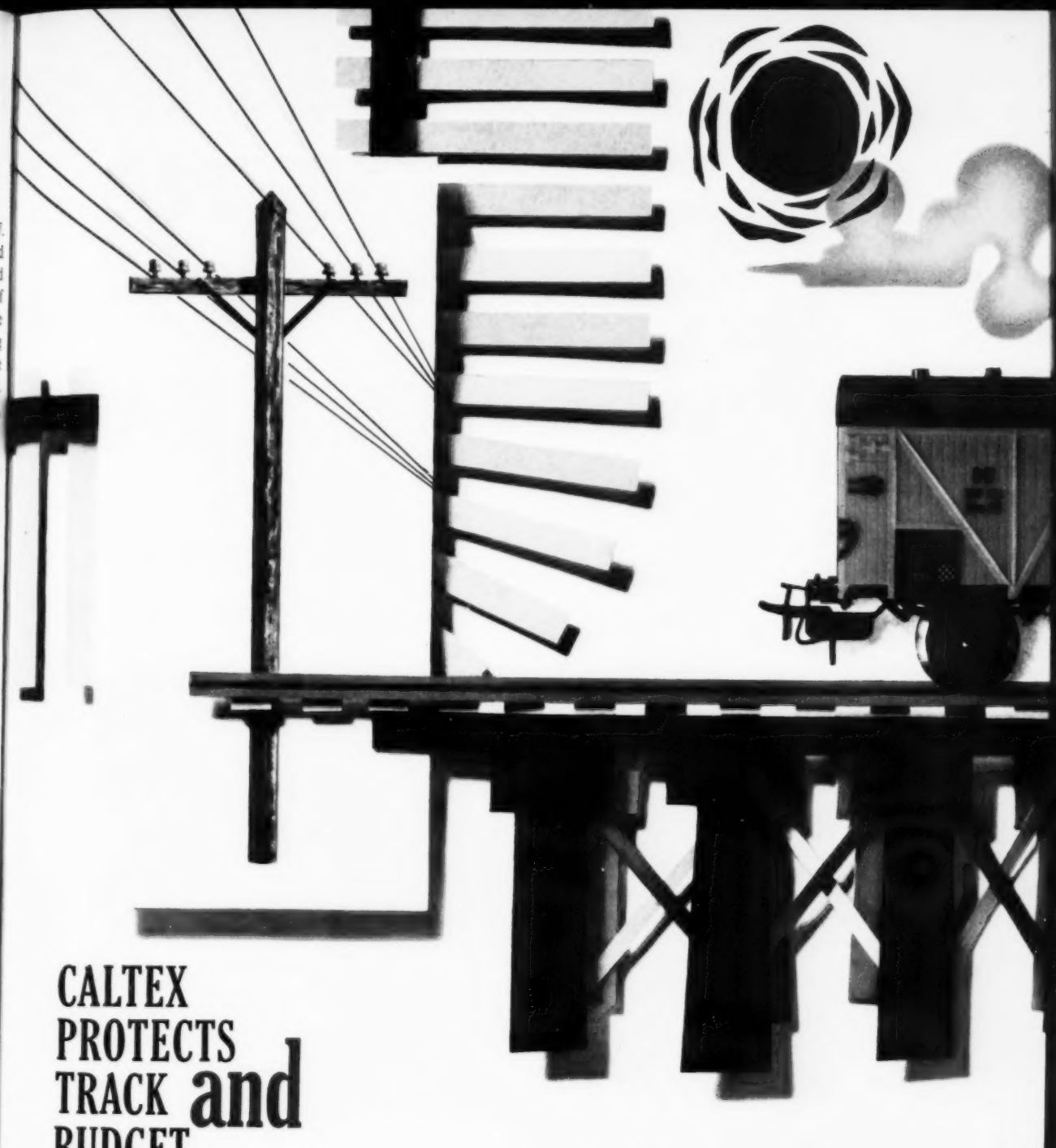
Many railway freight charges are the same from origins that are rather widely separated. The result of using a rate based on an average in such a case is that the rate is much higher than cost for shorter distances and may invite competition from highway carriers. Moreover, for the longer distances, the rate may be lower than competition requires.

I have known of maintenance foremen who would try to avoid jobs which would cost above the average, and seek to perform trivial and even unnecessary light repair work—just so they could reduce the average costs per vehicle repaired under their surveillance. This practice is sometimes known as "railroading for the books."

ENGINEERS ONLY?—A member of an eminent firm of consultants, who has long engaged in railway rehabilitation projects in many different countries, has told me of an able railway officer in an important country who is unable to aspire to any of the highest positions on his railway—simply because, in his country, the highest posts are reserved for graduate engineers.

I have seen some such prejudice as this in operation—to the railway's disadvantage—in many places. On one railway, candidates for promotion come, almost entirely, from the clerical ranks. On another, no one may aspire to high position who has ever been a member of one of the unions. Elsewhere union membership is a prerequisite to preferment.

Are such rigidities necessary? For the success of railway transportation, in an era of vigorous competition, can the railways afford to deny themselves the services of the ablest men through the continuance of such a rule?



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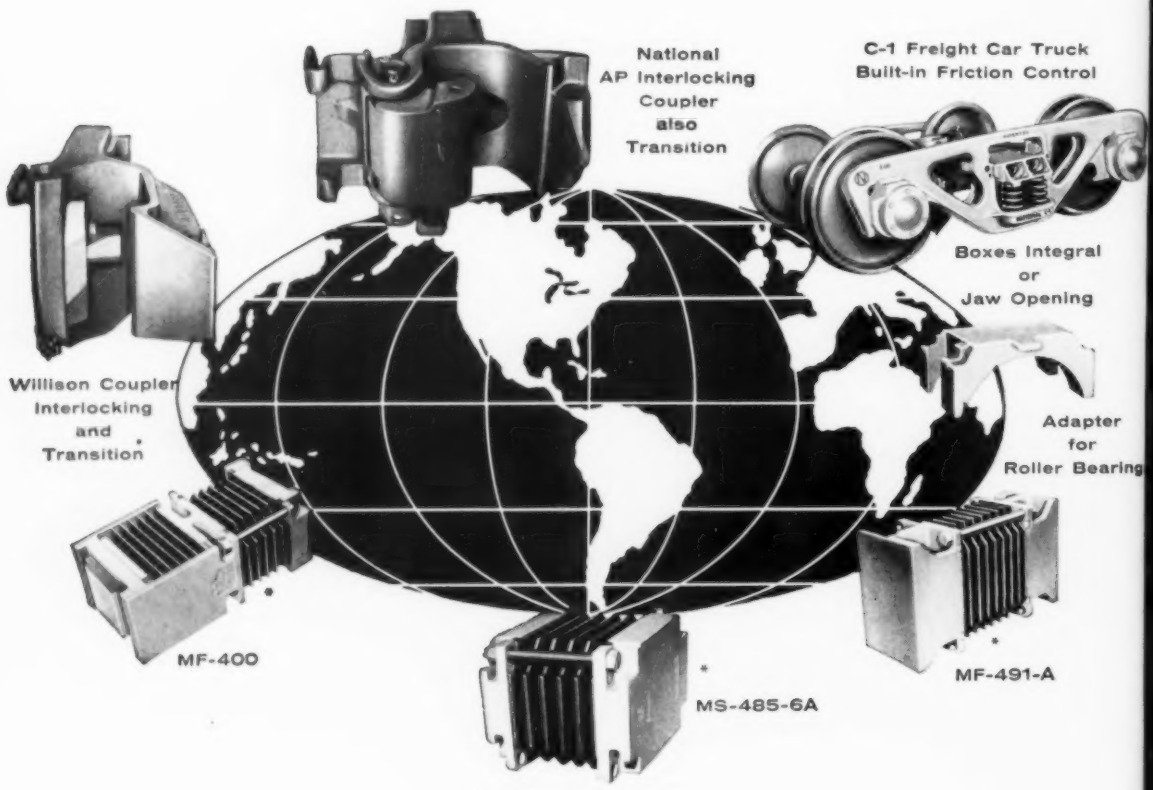

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